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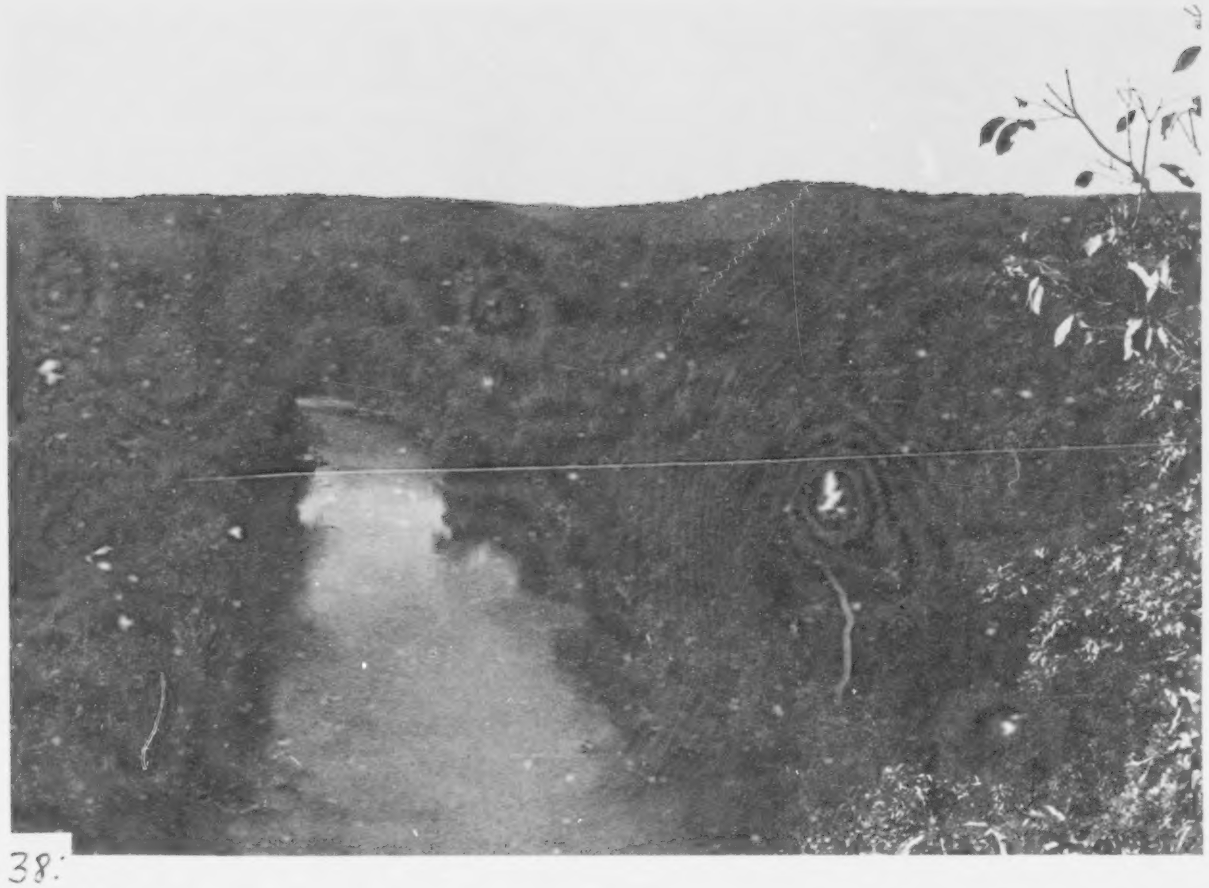
United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
United States Department
of Agriculture, Forest
Service, and the Missouri
Agricultural Experiment
Station

Soil Survey of Carter County, Missouri, Northern and Eastern Parts



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How To Use This Soil Survey

General Soil Map

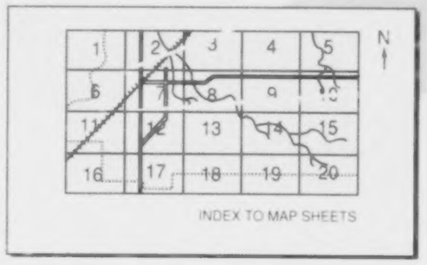
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

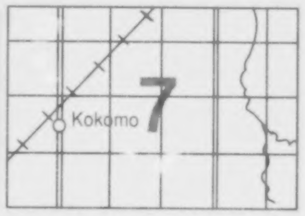
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

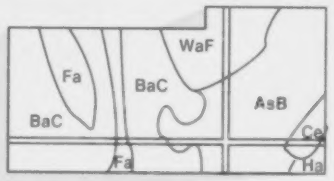




MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.

MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1987. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Missouri Agricultural Experiment Station. It is part of the technical assistance furnished to the Carter County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The Current River winding through a forested area in Carter County. About 83 percent of the survey area is forested.

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Foreword

This soil survey contains information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Russell C Mills

Russell C. Mills
State Conservationist
Soil Conservation Service

Soil Survey of Carter County, Missouri, Northern and Eastern Parts

By E. Rex Butler, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service and Forest Service,
in cooperation with
the Missouri Agricultural Experiment Station

Carter County is in the southeastern part of Missouri (fig. 1). It is part of the Ozark region of Missouri. On its northern border are Reynolds, Shannon, and Wayne Counties, and on its southern border are Oregon, Ripley, and Butler Counties. Wayne and Butler Counties are on the eastern border.

The survey area covers 223,762 acres, or about 350 square miles. Of this total, water areas larger than 40 acres make up only about 1 square mile. Carter County is rectangular. The Current River flows north to south through the central part of the county. The soil survey of the Mark Twain National Forest Area, published in 1975, included the southwestern part of Carter County.

Both major geologic areas of the county are remnants of the Salem Plateau and the surrounding highly dissected areas of the Ozarks. On the Salem Plateau, a thin layer of loess mantles the higher, less sloping areas and cherty residuum is exposed on the steeper side slopes. Cherty and clayey residuum is exposed on the highly dissected side slopes that make up the rest of the uplands in the survey area. About 7 percent of the acreage in the uplands is cleared and is used for crops, hay, or pasture or as homesites.

The flood plains are made up of cherty, silty, and loamy alluvial soils. About 30 percent of the acreage in these areas is cleared and is used mainly for pasture and hay.

General Nature of the County

This section gives general information concerning the county. It describes climate, early history, natural resources, and geology and physiography.

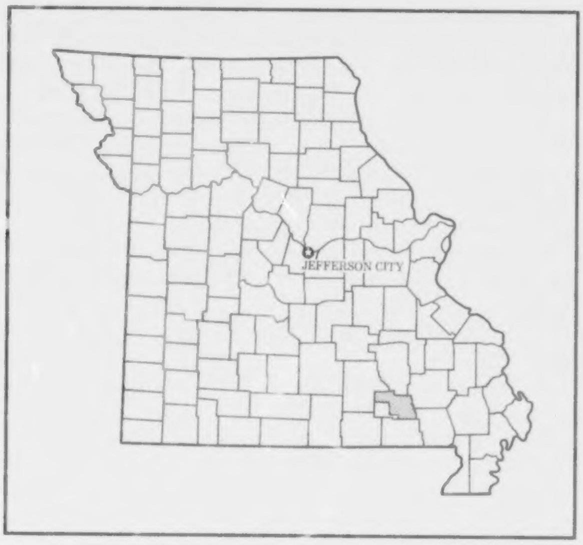


Figure 1.—Location of Carter County in Missouri.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Clearwater Dam in the period 1951 to 1986. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35 degrees F and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Clearwater Dam on January 24, 1963, is -19 degrees. In summer, the average temperature is 76 degrees and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on July 17, 1980, is 110 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 43.35 inches. Of this, about 23 inches, or 53 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 5.95 inches at Clearwater Dam on December 3, 1982. Thunderstorms occur on about 57 days each year.

The average seasonal snowfall is about 7 inches. The greatest snow depth at any one time during the period of record was 13 inches. On the average, 8 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 13 miles per hour, in spring.

Early History

In 1812, Zimri A. Carter settled a few miles south of the present location of Van Buren in what was then called the state of Wayne. On March 10, 1859, the Missouri Legislature established a new county, named after Zimri A. Carter. It was carved out of the northern part of Ripley County and the eastern part of Shannon County *(3)*. Van Buren, the county seat, was organized in 1833 *(4)*.

During the turbulent Civil War years, destruction of property in the county was not severe. The Union Army of Southeast Missouri was encamped in the area during the winter of 1862-63. The Snider House, site of one of several local skirmishes, is west of Van Buren.

The main industries in Carter County are lumbering and recreation. The scenic Current River, or La Riviere Courents, its original French name, almost evenly divides the county. It has long been a waterway and food source for the survey area. During the lumbering boom of the 1890's and early 1900's, thousands of logs were floated down the river to nearby Chicopee. The remains of 36 Indian villages and campgrounds have been found in the area.

In 1888, the Missouri Lumbering and Mining Company laid out the town of Grandin in the southern part of the county. Grandin was at one time the lumbering center of Missouri. Every year more than 100,000 acres of Carter County's virgin forest land was purchased and 15,000 to 20,000 acres harvested. From the mid-1890's to 1909, when the forest was depleted and the mills were closed, the yearly lumber production at Grandin's mills exceeded 60 million board feet. When the sawmills closed, Grandin and other milltowns in the area became like ghost towns.

The natural forest resource of the area is being restored through local, state, and national efforts. Much of Carter County lies in the Mark Twain National Forest, formerly called the Clark National Forest, which was founded between 1933 and 1937.

Natural Resources

Soil and natural vegetation are the most important resources in the county. Timber is the most important crop. Livestock, forage crops, and a small acreage of cultivated crops also are important.

Other important resources in the county are the abundant wildlife and the scenic, rugged terrain. The county also has numerous springs, many miles of scenic riverways, and wildlife reservations.

Ground water is available from drilled wells. Water in springs and even in some wells flows as artesian water. Most of the underlying consolidated rock formations in the county yield some water. Wells drilled for private water supplies are 100 to 200 feet deep and yield 3 to 10 gallons per minute. Wells for cities or other public water supplies generally are drilled to a depth of 350 to 800 feet and yield 20 to 250 gallons per minute. The wells having the greater yields extend into Potosi dolomite.

Geology and Physiography

By John W. Whitfield, geologist, Missouri Department of Natural Resources

Carter County is on the southern edge of the Salem Plateau, a subprovince of the Ozark Province. Large expanses of the county consist of rugged, wooded hills and narrow valleys. The Current River dissects this rough, scenic land from north to south. Some of the wider tracts of smooth land are on the flood plains along the Current River.

In the southeastern part of the county, the landscape becomes more rolling. The hills have broader tops and gentler slopes.

The physical and chemical processes involved in the weathering of bedrock resulted in cherty residuum that in places is more than 100 feet thick. These processes have contributed significantly to soil formation.

Weathering has also formed an extensive system of solution channels and caves in the bedrock. Long stretches of Pike Creek and Carter Creek are losing streamwater as a result of underground openings. Water entering the creeks flows or seeps into underground openings and travels through bedrock channels, sometimes for miles, before resurfacing as springs or becoming part of the ground water supply.

Weathering of bedrock has resulted in many springs on the Salem Plateau. Big Spring, the largest spring in Missouri, is in Carter County.

The exposed bedrock in Carter County is mostly Ordovician cherty dolomite and sandstone. Cambrian dolomite is exposed in the valleys of the Current River and Rogers Creek. Precambrian igneous rocks consisting of rhyolite and ash-flow tuff are exposed on hills in the northwestern part of the county, and granite crops out in small areas in the northeastern part.

From oldest to youngest, the geologic units that crop out in Carter County are the Precambrian St. Francois Mountain Volcanic Supergroup and St. Francois Mountain Intrusive Suite; the Cambrian Potosi Dolomite and Eminence Dolomite; and the Ordovician Gasconade Dolomite and Roubidoux Formation.

St. Francois Mountain Volcanic Supergroup.—This consists of very hard, fine to granular silicic ash-flow tuff and rhyolite. It is exposed on Stegall Mountain and on other nearby hills.

St. Francois Mountain Intrusive Suite.—This massive, coarse-grained, reddish granite crops out in a small isolated area in the northeastern part of the county.

Potosi Dolomite.—This brown to light gray dolomite, 300 to 450 feet thick, is in massive beds with abundant quartz druze. It is exposed as bluffs along the Current River. The residuum weathered from this dolomite has a distinct dark red color and contains chert and druze fragments.

Eminence Dolomite.—This gray to light brown dolomite is 300 to 350 feet thick and forms bluffs along the Current River. It has thin beds of chert and small druze-lined cavities.

Gasconade Dolomite.—This is a gray to light brown dolomite 350 to 400 feet thick. It has thin to massive beds of chert. The formation is divided into two units. The upper unit, 40 to 60 feet thick, consists of massive beds of coarse-grained dolomite and minor amounts of white to gray chert. The lower unit is very cherty, consisting of thin to medium beds of dolomite interbedded with white to bluish gray chert nodules and layers.

A sandy dolomite unit, 15 to 30 feet thick, at the base of the Gasconade represents the Gunter Sandstone Member.

Roubidoux Formation.—In large areas in Carter County, the Roubidoux remains in relict layers of sandstone and chert. The effects of weathering have reduced the bedrock to an aggregation of clay, sandstone, and chert. The formation, where intact, consists of cherty dolomite, sandstone, and chert. Parts of the formation consist of thick beds of hard quartzitic sandstone.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The descriptions, names, and delineations of the soils identified on the general soil map of this county do not fully agree with those of the soils identified on the maps of adjacent counties published at a different date. Differences are the result of additional soil data, variations in the intensity of mapping, and correlation decisions that reflect local conditions. In some areas combining small acreages of similar soils that respond to use and management in much the same way is more practical than mapping these soils separately.

Soil Descriptions

1. Captina-Clarksville-Wilderness Association

Deep, gently sloping to very steep, moderately well drained and somewhat excessively drained, silty and very cherty soils

This association consists of soils on uplands dissected by numerous small, narrow, V-shaped drainageways. It is characterized by partly wooded, broad to narrow ridgetops and wooded side slopes of strongly contrasting local relief adjacent to drainageways. Slopes range from 2 to 40 percent.

This association makes up about 25 percent of the survey area. It is about 36 percent Captina soils, 31 percent Clarksville soils, 25 percent Wilderness soils, and 8 percent minor soils (fig. 2).

Captina soils are moderately well drained and are gently sloping and moderately sloping. They generally are on the broader ridgetops and wide toe slopes. Typically, the surface layer is brown, very friable silt loam. The upper part of the subsoil is yellowish brown, firm silt loam and strong brown silty clay loam. The lower part is a firm and brittle fragipan of light yellowish brown and strong brown silty clay loam and multicolored very cherty silty clay loam.

Clarksville soils are somewhat excessively drained and are gently sloping to very steep. They generally are on side slopes and narrow ridgetops. Typically, the surface layer is brown, very friable very cherty silt loam. The subsoil is strong brown, friable very cherty silt loam in the upper part; strong brown and yellowish red, firm very cherty silty clay loam in the next part; and multicolored, firm very cherty silty clay in the lower part.

Wilderness soils are moderately well drained and are gently sloping to strongly sloping. They generally are on the crest of ridges and on side slopes next to drainageways. Typically, the surface layer is dark brown, very friable very cherty silt loam. The upper part of the subsoil is brown, friable very cherty silt loam and brown, firm extremely cherty silty clay loam. The lower part is a firm and brittle fragipan of very pale brown and strong brown very cherty silt loam and multicolored very cobbly sandy loam.

Minor in this association are the well drained Elk and Secesh soils on high flood plains and the very gently sloping and gently sloping Midco soils on narrow flood plains.

A small percent of the acreage in this association has been cleared. Most of the cleared areas on uplands are used for hay and pasture. Grain sorghum, soybeans, and garden crops are grown in small fields on the stream terraces and foot slopes bordering the

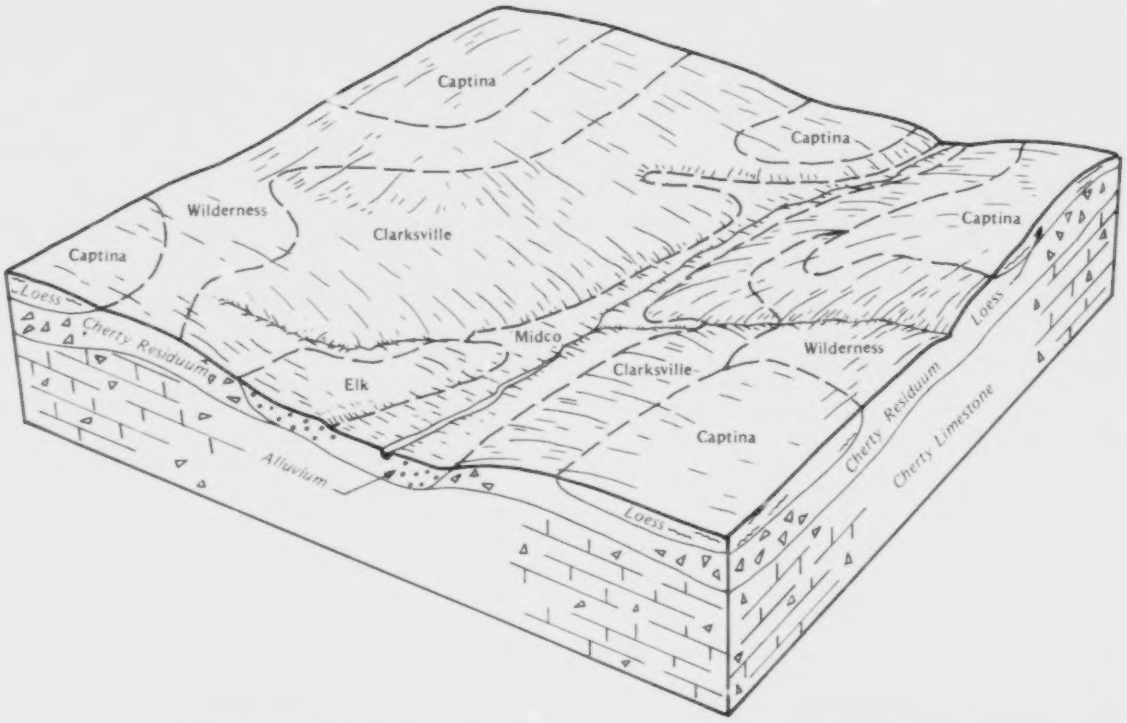


Figure 2.—Pattern of soils and parent material in the Captina-Clarksville-Wilderness association.

drainageways. Timbered areas support mixed hardwoods and pine.

The soils in this association are suited to trees. The timber stands generally are of low quality because of past high-grade harvesting. The equipment limitation and the erosion hazard are the major management concerns. They are caused by the slope or the content of chert. Seedling mortality and windthrow are additional management concerns on the Wilderness and Captina soils.

The less sloping major soils are suited to sanitary facilities and building site development. Slope, chertiness, seepage, and wetness are the main management concerns. Flooding is a hazard on the minor soils on flood plains.

2. Poynor Association

Deep, gently sloping to very steep, well drained, very cherty soils

This association consists of soils on uplands dissected by V-shaped drainageways and very narrow flood plains and terraces. It is characterized by long, very narrow wooded ridgetops and side slopes of strongly contrasting local relief. Slopes range from 3 to 40 percent.

This association makes up about 30.5 percent of the survey area. It is about 84 percent Poynor and similar soils and 16 percent minor soils.

Typically, the surface layer of the Poynor soils is very dark grayish brown, friable very cherty silt loam. The subsurface layer is brown very cherty silt loam. The subsoil is strong brown, firm very cherty silty clay loam in the upper part; yellowish red, firm extremely cherty silty clay loam in the next part; and red, firm clay in the lower part.

Minor in this association are the shallow Gasconade soils on uplands, the silty Elk and Secesh soils on high flood plains, and the nearly level and very gently sloping Gladden, Midco, and Wideman soils on narrow flood plains.

A very small acreage of the soils on uplands is

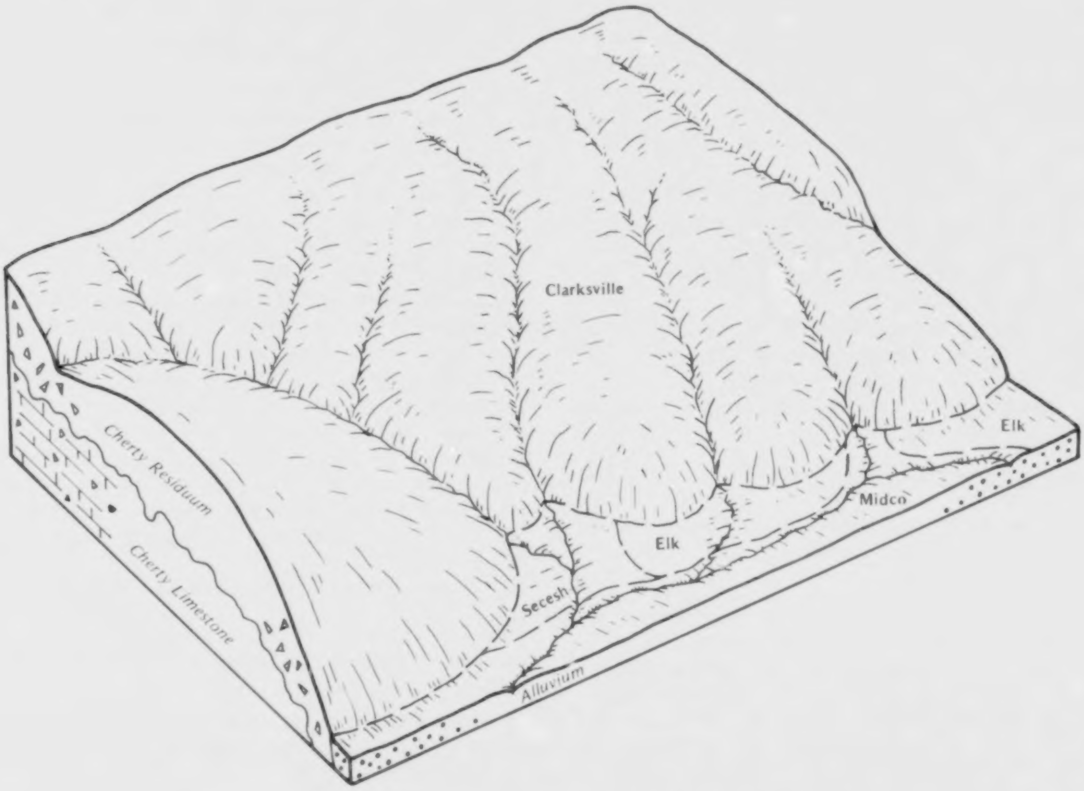


Figure 3.—Pattern of soils and parent material in the Clarksville association.

cleared. Timbered areas support mixed hardwoods and pine.

The soils in this association are suited to trees. Many areas have low-quality stands because of past high-grade harvesting. The equipment limitation and the erosion hazard are the main management concerns.

The less sloping major soils are suited to most kinds of sanitary facilities and building site development. Slope, chertiness, and stoniness are the main limitations. Flooding is a hazard on the minor soils on flood plains.

3. Clarksville Association

Deep, gently sloping to very steep, somewhat excessively drained, very cherty soils

This association consists of soils on uplands highly dissected by V-shaped drainageways and very narrow flood plains. It is characterized by long, narrow wooded ridgetops and side slopes of strongly contrasting local relief. Slopes range from 3 to 40 percent.

This association makes up 38 percent of the survey area. It is about 92 percent Clarksville and similar soils and 8 percent minor soils (fig. 3).

Typically, the surface layer of the Clarksville soils is brown very cherty silt loam. The subsoil is strong brown, friable very cherty silt loam in the upper part; strong brown and yellowish red, firm very cherty silty clay loam in the next part; and multicolored, firm very cherty silty clay in the lower part.

Minor in this association are the somewhat excessively drained Midco soils on low flood plains; the well drained Elk and Secesh soils on high flood plains; and Rock outcrop and the somewhat excessively drained, shallow Gasconade soils on the steeper slopes adjacent to the flood plains.

Most of the acreage in this association supports mixed hardwood and pine. Some small openings are used as homesites. About 30 percent of the minor soils on terraces and flood plains is cleared. Pasture and hay are the major land uses. Erosion and streambank cutting are the major management concerns in cleared areas.

The soils in this association are suited to trees. Much of the timber is of low quality because of past high-grade harvesting, overgrazing, and fire. The equipment limitation and the erosion hazard are the main management concerns.

The less sloping major soils are suited to building site development and sanitary facilities. The high content of chert and the slope are the main management concerns. Flooding is a hazard on the minor soils on flood plains.

4. Irondale-Clarksville Association

Moderately deep and deep, gently sloping to very steep, well drained and somewhat excessively drained, very cobbly and very cherty soils

This association consists of soils on mountainous uplands highly dissected by V-shaped drainageways and very narrow flood plains. It is at the highest elevations in the survey area. The mountains are dome shaped and are longer than they are wide. They are bordered by long, narrow ridges on the lower, deeply truncated landforms. Stones cover 3 to 15 percent of the surface in areas of the Irondale soils. Slopes range from 3 to 40 percent.

This association makes up 1.5 percent of the survey area. It is about 48 percent Irondale soils, 41 percent Clarksville and similar soils, and 11 percent minor soils.

Irondale soils are moderately deep, moderately steep to very steep, and well drained. They are at the highest elevations. Typically, the surface layer is very dark grayish brown, very friable very cobbly silt loam. The subsurface layer is brown, very friable very cobbly silt loam. The subsoil is yellowish brown, friable very cobbly silt loam in the upper part; brown, friable very cobbly silt loam in the next part; and strong brown, friable extremely cobbly silt loam in the lower part. Hard rhyolite bedrock is at a depth of about 35 inches.

Clarksville soils are deep, gently sloping to very steep, and somewhat excessively drained. They generally are on narrow ridgetops and the upper side slopes and toe slopes. Typically, the surface layer is brown, very friable very cherty silt loam. The subsoil is strong brown, friable very cherty silt loam in the upper part; strong brown and yellowish red, firm very cherty silty clay loam in the next part; and multicolored, firm very cherty silty clay in the lower part.

Minor in this association are the deep, very gently sloping and gently sloping Midco soils on flood plains.

Most of this association supports mixed hardwoods and pine. A few very small areas of the less sloping soils on the mountain domes are cleared and used for wildlife food plots of native warm-season grasses and shrubs.

The soils in this association are best suited to trees, wildlife habitat, and recreational uses. The timber stands are of low quality on the Irondale soils but of fair or good quality on the Clarksville soils. The erosion hazard and the equipment limitation caused by the high content of chert and the steep and very steep slopes are the main management concerns.

In most areas this association is not suited to building site development or sanitary facilities. The depth to bedrock, the slope, and the high content of chert are the main limitations. Onsite investigation generally is needed to identify suitable building sites.

5. Clarksville-Captina-Poynor Association

Deep, gently sloping to very steep, somewhat excessively drained to moderately well drained, very cherty and silty soils

This association consists of soils on uplands highly dissected by V-shaped drainageways and very narrow flood plains. It is characterized by remnants of an older plateau. Gently sloping and moderately sloping, silty soils are on the wider summits, and cherty soils are on narrow ridgetops and the steeper side slopes. Slopes range from 2 to 40 percent.

This association makes up about 5 percent of the survey area. It is about 55 percent Clarksville soils, 19 percent Captina soils, 13.5 percent Poynor soils, and 12.5 percent minor soils (fig. 4).

Clarksville soils are somewhat excessively drained and are gently sloping to very steep. They generally are on narrow ridgetops and steep side slopes that are deeply dissected. Typically, the surface layer is brown very cherty silt loam. The subsoil is strong brown, friable very cherty silt loam in the upper part; strong brown and yellowish red, firm very cherty silty clay loam in the next part; and multicolored, firm very cherty silty clay in the lower part.

Captina soils are moderately well drained and are gently sloping and moderately sloping. They generally are on broad ridgetops and toe slopes. Typically, the surface layer is brown, very friable silt loam. The upper part of the subsoil is yellowish brown silt loam and

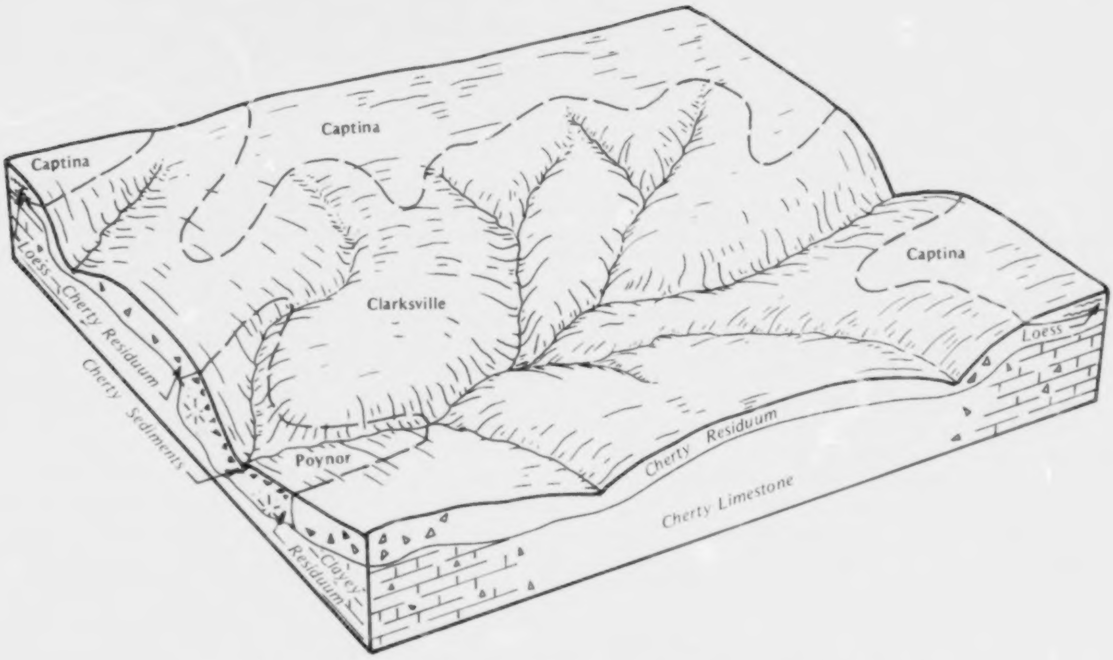


Figure 4.—Pattern of soils and parent material in the Clarksville-Captina-Poynor association.

strong brown silty clay loam. The lower part is a firm and brittle fragipan of light yellowish brown and strong brown, mottled silty clay loam and multicolored very cherty silty clay loam.

Poynor soils are gently sloping to very steep and are well drained. They are on the lower side slopes. Typically, the surface layer is very dark grayish brown, friable very cherty silt loam. The subsurface layer is brown very cherty silt loam. The subsoil is strong brown, firm very cherty silty clay loam in the upper part; yellowish red, firm extremely cherty silty clay loam in the next part; and red, firm clay in the lower part.

Minor in this association are the very gently sloping and gently sloping Elk and Midco soils and the gently sloping to strongly sloping Wilderness soils. Elk soils are on the high flood plains, and Midco soils are on narrow, low flood plains. Wilderness soils are on the crest of ridges and on the upper side slopes. They are cherty and extremely cherty above a fragipan.

Most of the acreage supports mixed hardwoods and pine. Cleared areas, which generally are on stream terraces, are used for pasture and for winter wheat.

The soils in this association are suited to trees. Many timber stands are of low quality, however, because of past high-grade harvesting.

In many areas this association is suited to sanitary facilities and building site development. The high content of chert, slope, and inaccessibility are the main management concerns. Flooding is a hazard on the minor soils on flood plains.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Clarksville very cherty silt loam, 3 to 9 percent slopes, is a phase of the Clarksville series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Wilderness-Clarksville complex, 9 to 14 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The Rock outcrop part of the Gasconade-Rock outcrop complex, 14 to 50 percent slopes, is an example.

The descriptions, names, and delineations of soils identified on the detailed soil maps of this county do not fully agree with those of the soils identified on the maps of adjacent counties published at a different date. Differences are the result of additional soil data, variations in the intensity of mapping, and correlation decisions that reflect local conditions. In some areas combining small acreages of similar soils that respond to use and management in much the same way is more practical than mapping these soils separately.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

14B—Elk silt loam, 1 to 4 percent slopes. This deep, very gently sloping and gently sloping, well drained soil is on the high flood plains along the larger streams and their major tributaries. It is occasionally flooded. Areas are elongated and range from 10 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable silt loam about 6 inches thick. The subsurface layer is dark brown, friable silt loam about 4 inches thick. The

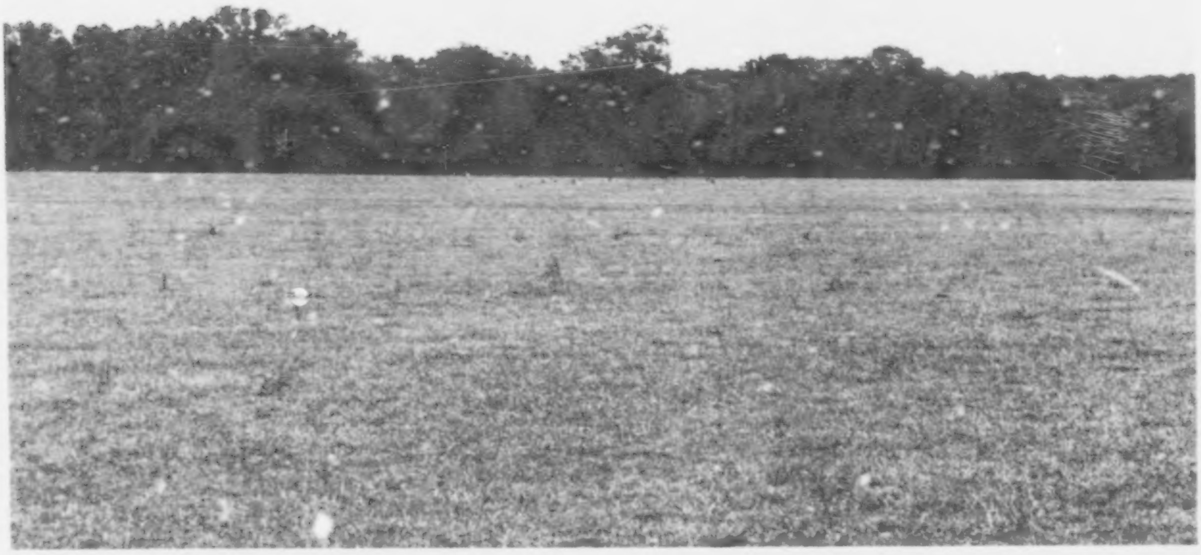


Figure 5.—A pastured area of Elk silt loam, 1 to 4 percent slopes.

subsoil is about 30 inches thick. It is strong brown, friable silty clay loam in the upper part and strong brown, mottled, firm silty clay loam in the lower part. The substratum to a depth of 60 inches or more is yellowish brown, mottled, firm silty clay loam.

Included with this soil in mapping are areas of soils at the higher elevations adjacent to the larger drainageways. These soils are more sandy throughout than the Elk soil or have numerous small chert fragments throughout. Also included are areas of Midco and Secesh soils. The somewhat excessively drained Midco soils are at the slightly lower elevations and are near small drainageways. Secesh soils have gravel and chert at a moderate depth. They are at the slightly lower elevations adjacent to the flood plains. Included soils make up about 5 to 15 percent of the unit.

Permeability is moderate in the Elk soil, and surface runoff is slow or medium. The available water capacity is high. Natural fertility is medium, and the organic matter content is moderate. This soil can be easily tilled throughout a wide range in moisture content.

Most areas are used for pasture or hay (fig. 5). A few areas are used for cultivated crops, and a small acreage is used for timber. This soil is suited to grasses and legumes for pasture and hay. It also is suited to wheat, soybeans, grain sorghum, and vegetables. Erosion is a major hazard if the soil is cultivated and the surface is bare for a long period. Proper management of crop residue and green manure crops help to control erosion, maintain or increase the organic matter content, improve tilth, and increase the rate of water infiltration. Because flooding is a hazard, crops should be planted late in spring and harvested early in fall. The flooding is of brief duration and generally occurs too early in the growing season for winter crops to be damaged.

This soil is well suited to legumes, such as red clover and alfalfa; to cool-season grasses, such as orchardgrass and tall fescue; and to warm-season grasses, such as big bluestem and indiangrass. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth. Timely deferment of grazing helps to keep the pasture in good condition. Timely tillage and a quickly established ground cover help to prevent excessive soil loss when a pasture is seeded.

This soil is suitable for trees. No major hazards or limitations affect harvesting.

This soil is unsuitable for building site development and sanitary facilities because of the occasional flooding.

The land capability classification is IIe. The woodland ordination symbol is 5A.

15A—Gladden sandy loam, sandy substratum, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, well drained soil is on low flood plains along the major streams and their tributaries. It is occasionally flooded. Areas are elongated and range from 10 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, very friable sandy loam about 6 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable fine sandy loam about 27 inches thick. The substratum to a depth of 60 inches or more is yellowish brown, very friable loamy sand and dark yellowish brown, loose very cherty sand.

Included with this soil in mapping are areas of Elk, Midco, and Wideman soils. Elk soils are chert-free silt loam throughout. They are in landscape positions similar to those of the Gladden soil. Midco and Wideman soils are in the lower positions. Midco soils are cherty throughout. Wideman soils have more sand than the Gladden soil. Included soils make up about 15 percent of the unit.

Permeability is moderate in the upper part of the Gladden soil and moderately rapid and rapid in the lower part. Surface runoff is slow. The available water capacity is medium. Natural fertility also is medium, and the organic matter content is moderate. The surface layer is friable and can be easily tilled.

Most areas are used for hay and pasture or for soybeans, grain sorghum, or wheat. This soil is well suited to crops and to hay and pasture. Crops usually are adversely affected by insufficient soil moisture during dry summer months. The occasional flooding seldom occurs during the cropping season; however, fields of winter wheat are flooded for short periods. Minimum tillage helps to control erosion. When row crops are grown, leaving the crop residue on the surface helps to maintain tilth.

This soil is best suited to lespedeza, tall fescue, and warm-season grasses, such as switchgrass. Insufficient soil moisture is common during summer months. The stands of native pasture plants are seldom injured by the short-duration flooding. Timely deferment of grazing helps to keep the pasture in good condition.

A few small areas support native hardwoods. This soil is suited to trees. No major hazards or limitations affect harvesting.

This soil is unsuited to building site development and onsite waste disposal because of the occasional flooding.

The land capability classification is IIw. The woodland ordination symbol is 4A.

18A—Auxvasse silt loam, 0 to 3 percent slopes. This deep, nearly level and very gently sloping, somewhat poorly drained soil is on low stream terraces. It is subject to rare flooding. Areas are irregular in shape and range from 10 to several hundred acres in size.

Typically, the surface layer is grayish brown, very friable silt loam about 7 inches thick. The subsurface layer is light gray, mottled, very friable silt loam about 7 inches thick. The subsoil is about 31 inches thick. It is light brownish gray, mottled, firm silty clay in the upper part; gray, mottled, very firm clay in the next part; and dark gray, very firm silty clay in the lower part. The substratum to a depth of 60 inches or more is light gray, mottled, firm silty clay loam. In some areas the subsoil has less clay. In other areas the surface layer and subsoil have some fine, rounded chert fragments. In a few areas the subsoil is browner.

Included with this soil in mapping are poorly drained soils in the lower depressional areas. These soils make up about 10 percent of the unit.

Permeability is very slow in the Auxvasse soil. Surface runoff also is very slow. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is low. A perched water table is at a depth of 1 to 2 feet during most winter and spring months.

Most areas are used for hay and pasture. Some areas support timber. This soil is suited to grasses and legumes that can withstand wetness, such as ladino clover, tall fescue, and indiangrass. The wetness is the major management problem. Grazing during wet periods results in severe compaction. Deferment of grazing during wet or dry periods helps to keep the pasture in the best condition.

This soil is suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Harvesting activities should be conducted during the driest part of the summer. Reinforcement planting on prepared ridges may be needed if seedling mortality is a problem. The stands should be thinned less intensively and more frequently than the stands in areas where windthrow is less likely.

This soil is unsuited to building site development and onsite waste disposal because of the flooding.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

19B—Midco very cherty loam, 1 to 4 percent slopes. This deep, very gently sloping and gently sloping, somewhat excessively drained soil is on narrow flood plains. It is frequently flooded. Individual areas are long and narrow and are parallel to streams. They range from 10 to more than 100 acres in size.

Typically, the surface layer is dark brown, friable very cherty loam about 7 inches thick. The substratum to a depth of 60 inches or more is strong brown, friable very cherty and extremely cherty sandy loam. In a few places the surface layer is cherty silt loam. In some areas the soil is more sandy throughout.

Included with this soil in mapping are small areas of the well drained Elk and Secesh soils in narrow drainageways and scattered small areas of the moderately well drained Captina soils. Included soils make up about 10 percent of the unit.

Permeability is moderately rapid in the Midco soil, and surface runoff is slow. The available water capacity is low. Natural fertility is medium, and the organic matter content is low. The very cherty surface layer hinders tillage, and the very cherty substratum slightly hinders root development.

More than half of the acreage is used for pasture or hay. A few of the higher areas are used for row crops or winter wheat. A large acreage is used for timber. This soil is best suited to lespedeza, tall fescue, and warm-season grasses, such as switchgrass, for hay and pasture. Insufficient soil moisture is a severe limitation during the summer in most years. Also, frequent flooding of short duration is a severe hazard. Warm-season grasses are more productive during the dry summer months than other grasses. The content of chert may hinder the use of tillage equipment.

This soil is suited to trees. Seedling mortality is a hazard because of the droughtiness. Reinforcement planting or the selection of container-grown nursery stock for planting increases seedling survival rates.

This soil is unsuited to building site development and onsite waste disposal because of the frequent flooding.

The land capability classification is IIIw. The woodland ordination symbol is 3F.

24B—Secesh silt loam, 1 to 4 percent slopes. This deep, very gently sloping and gently sloping, well drained soil is on flood plains. It is occasionally flooded. Areas are long and narrow and range from 10 to more than 30 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown, firm silty clay loam in the upper part and strong brown, firm extremely cherty sandy clay loam in the lower part. In places the surface layer is loam or sandy loam.

Included with this soil in mapping are scattered small areas of Elk and Midco soils. Elk soils do not have chert in the subsoil. Midco soils are cherty throughout. Included soils make up about 5 to 15 percent of the unit.

Permeability is moderate in the Secesh soil, and surface runoff is slow. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is moderately low. The surface layer is friable and can be easily tilled throughout a fairly wide range in moisture content.

Most areas are used for pasture or hay. Some areas are used for row crops, winter wheat, or timber. This soil is suited to grain sorghum, soybeans, winter wheat, and vegetables and to grasses and legumes for hay or pasture. If the soil is used for cultivated crops, flooding is the major hazard. It generally is brief, however, and occurs too early in the growing season for winter wheat to be damaged.

This soil is well suited to legumes, such as red clover and alfalfa; to cool-season grasses, such as orchardgrass; and to warm-season grasses, such as switchgrass. The stands of native pasture plants are seldom affected by the short-duration flooding. Timely deferment of grazing during wet periods helps to keep the pasture in the best condition.

A few small areas support native hardwoods. Pine plantations, 30 or more years old, are in some areas. This soil is suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is unsuitable for building site development and onsite waste disposal because of the occasional flooding.

The land capability classification is IIw. The woodland ordination symbol is 3A.

26B—Wideman fine sandy loam, 1 to 4 percent slopes. This deep, very gently sloping and gently sloping, excessively drained soil is on flood plains and natural levees. It is frequently flooded. Areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is dark brown, friable fine sandy loam about 9 inches thick. The substratum is about 21 inches of dark brown and light yellowish brown, loose fine sand and dark yellowish brown, loose loamy fine sand. Next is a buried surface layer of very dark grayish brown, friable fine sandy loam about 16 inches thick. Below this to a depth of 60 inches or more is yellowish brown, loose sand.

Included with this soil in mapping are small areas of the well drained Elk and Gladden soils. These soils are in the higher or lower areas adjacent to the boundaries of the unit. They make up about 5 to 15 percent of the unit.

Permeability is moderately rapid in the Wideman soil, and surface runoff is slow. The available water capacity is low. Natural fertility and the organic matter content also are low. The surface layer is friable and can be easily tilled throughout a wide range in moisture content.

Most areas support native timber. Several areas where the hazard of flooding is less severe are used for pasture and hay. Some areas are used for winter wheat. This soil generally is unsuitable for cultivated crops because of the hazard of flooding and the droughtiness.

In the areas used for pasture, native warm-season grasses are the best suited species because they can grow during the summer, when an insufficient moisture supply is common. Grasses and legumes generally are not planted on this soil.

This soil is suited to trees. Flooding and seedling mortality are the major management concerns. Harvesting activities should not be conducted during or immediately after periods of flooding. Reinforcement planting or the selection of container-grown nursery stock for planting increases seedling survival rates.

This soil is unsuited to sanitary facilities and building site development because of the frequent flooding.

The land capability classification is Vw. The woodland ordination symbol is 7S.

38B—Captina silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on broad ridgetops in the uplands. Most slopes are convex, but some are concave. Areas generally are elongated and range from 10 to more than 200 acres in size.

Typically, the surface layer is brown, very friable silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, friable silt loam and strong brown, firm silty clay loam. The lower part is a firm, brittle fragipan of light yellowish brown and strong brown silty clay loam and multicolored very cherty silty clay loam. In places the lower part of the subsoil has less chert.

Included with this soil in mapping are areas of the moderately sloping Captina soils and areas of Clarksville and Wilderness soils. Clarksville and Wilderness soils have a cherty surface layer. They are on the ends of ridges and on the steeper slopes. Included soils make up about 5 to 15 percent of the unit.

Permeability is moderate above the fragipan in the Captina soil and slow in the fragipan. Surface runoff is medium. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is low. The surface layer is friable and can be easily tilled, but it tends to crust and puddle if tilled when wet. The root zone is limited by the fragipan. A perched water table is above the fragipan during wet periods.

More than 75 percent of the acreage supports timber. Cleared areas generally are used for pasture (fig. 6) or hay, but a few are used for winter wheat or row crops. This soil is suited to grain sorghum, soybeans, and wheat. It also is suitable for orchards. It is very erodible if it is extensively cultivated. A system of conservation tillage that leaves a protective cover of crop residue on the surface, winter cover crops, and contour farming help to control erosion. Leaving large amounts of crop residue on the surface helps to maintain or increase the organic matter content and improves tilth.

This soil is suited to lespedeza; to cool-season grasses, such as orchardgrass and tall fescue; and to warm-season grasses, such as big bluestem, indiangrass, and switchgrass. It is best suited to warm-season grasses, which can grow during the summer when an insufficient moisture supply is common. Timely grazing helps to keep the pasture in the best condition. Erosion is a hazard in newly seeded areas. Timely tillage and a quickly established ground cover help to prevent excessive soil loss.

This soil is suited to trees. Windthrow is a management concern. The stands should be thinned less intensively and more frequently than the stands in areas where windthrow is less likely.

This soil is suitable for building site development and onsite waste disposal. The shrink-swell potential and the wetness are limitations on sites for dwellings with basements, and the slope and the wetness are limitations on sites for dwellings without basements. Foundations, basement walls, and footings should be properly designed and constructed with adequately reinforced concrete. These measures minimize the damage caused by shrinking and swelling. Sealing the walls and installing tile drains around footings minimize the damage caused by excessive wetness. Commercial buildings should be designed so that they conform to

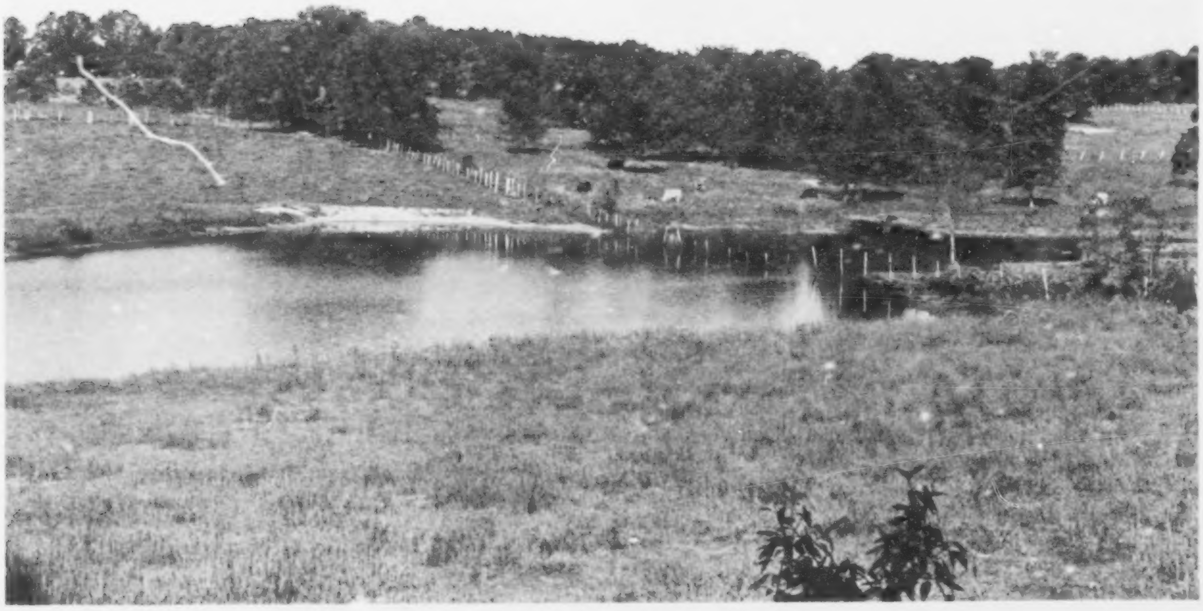


Figure 6.—A good pasture and a pond in an area of Captina silt loam, 2 to 5 percent slopes.

the natural slope of the land. Otherwise, land shaping is needed. Sites for sewage lagoons can be leveled. In places the sewage can be piped to adjacent areas where the soils are better suited to lagoons.

Low strength, wetness, frost action, and slope are limitations on sites for local roads and streets. Strengthening the base with suitable material helps to prevent the damage caused by low strength. Grading the road so that it sheds water, constructing adequate roadside ditches, and installing culverts minimize the damage caused by wetness and frost action. Some cutting and filling may be needed because of the slope. Erosion is a severe hazard on excavated sites. A plant cover should be restored by seeding and mulching as soon after construction as possible.

The land capability classification is IIe. The woodland ordination symbol is 3D.

38C—Captina silt loam, 5 to 9 percent slopes. This moderately sloping, moderately well drained soil is on broad ridgetops, side slopes, and foot slopes. Most slopes are convex, but some are concave. Areas generally are elongated and range from 10 to more than 200 acres in size.

Typically, the surface layer is brown, very friable silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, mottled, friable silt loam and strong brown silty clay loam. The lower part is a firm, brittle fragipan of light yellowish brown and strong brown, mottled silty clay loam and multicolored very cherty silty clay loam. In places the lower part of the subsoil has less chert. Some areas are gently sloping.

Included with this soil in mapping are areas of Clarksville and Wilderness soils. These soils have a cherty surface layer. They are on the ends of ridges and on the steeper slopes. They make up about 5 to 10 percent of the unit.

Permeability is moderate above the fragipan in the Captina soil and slow in the fragipan. Surface runoff is medium. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is low. The surface layer is friable and can be easily tilled, but it tends to crust and puddle if tilled when wet. The root zone is limited by the fragipan. A perched water table is above the fragipan during wet periods.

More than 75 percent of the acreage supports timber. Cleared areas generally are used for pasture or hay (fig. 7), but a few are used for winter wheat or row crops. This soil is suited to grain sorghum, soybeans, and wheat. It also is suitable for orchards. It is very erodible if it is extensively cultivated. A system of conservation tillage that leaves a protective cover of crop residue on the surface, winter cover crops, and contour farming help to control erosion. Leaving large amounts of crop residue on the surface helps to maintain or increase the organic matter content and improves tilth.

This soil is suited to lespedeza; to cool-season grasses, such as orchardgrass and tall fescue; and to warm-season grasses, such as big bluestem, indiangrass, and switchgrass. It is best suited to warm-season grasses, which can be grown during hot summer months, when insufficient soil moisture is common. Timely grazing helps to keep the pasture in the best condition. Erosion is a hazard in newly seeded areas. Timely tillage and a quickly established ground cover help to prevent excessive soil loss.

This soil is suited to trees. Windthrow is a management concern. The stands should be thinned

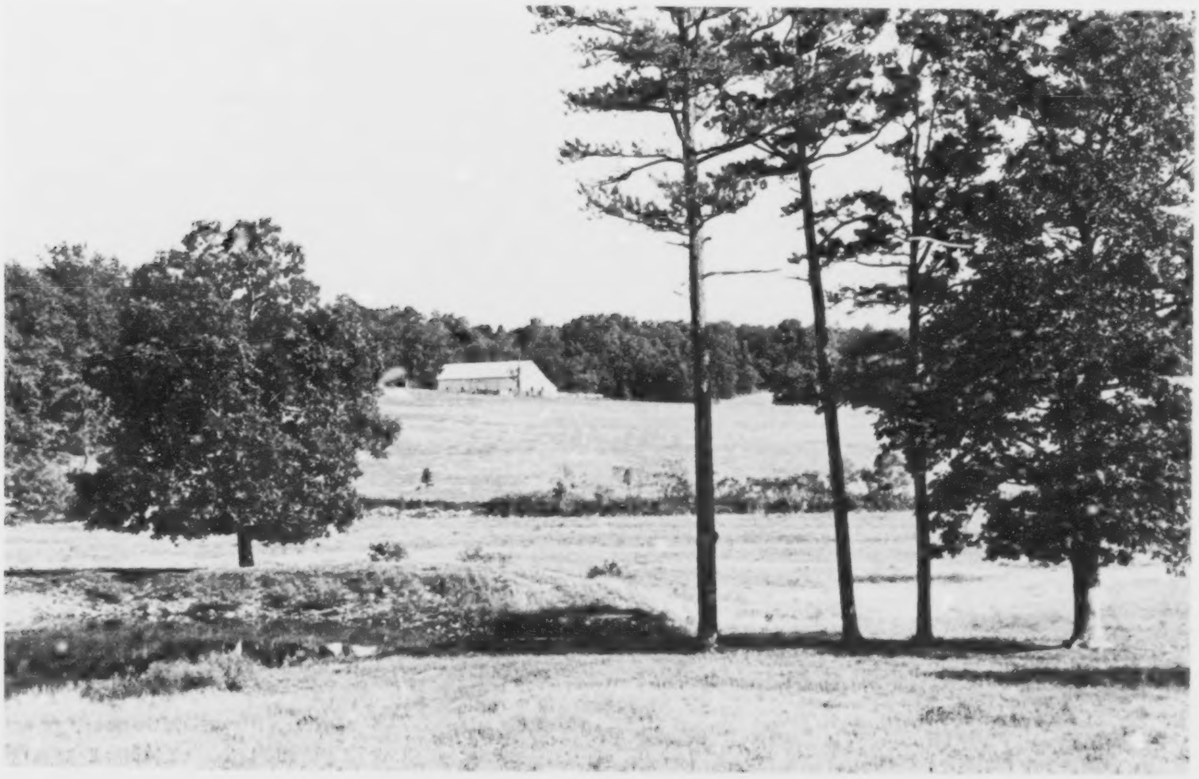


Figure 7.—Good pasture and hayland in an area of Captina silt loam, 5 to 9 percent slopes.

less intensively and more frequently than the stands in areas where windthrow is less likely.

This soil is suitable for building site development and onsite waste disposal. The shrink-swell potential and the wetness are limitations on sites for dwellings with basements, and the slope and the wetness are limitations on sites for dwellings without basements. Foundations, basement walls, and footings should be properly designed and constructed with adequately reinforced concrete. These measures minimize the damage caused by shrinking and swelling. Sealing the walls and installing tile drains around footings minimize the damage caused by excessive wetness. Commercial buildings should be designed so that they conform to the natural slope of the land. Otherwise, land shaping is needed. Sites for sewage lagoons can be leveled. In places the sewage can be piped to adjacent areas where the soils are better suited to lagoons.

Low strength, wetness, frost action, and slope are limitations on sites for local roads and streets. Strengthening the base with suitable material helps to prevent the damage caused by low strength. Grading the road so that it sheds water, constructing adequate roadside ditches, and installing culverts minimize the damage caused by wetness and frost action. Some cutting and filling may be needed because of the slope. Erosion is a severe hazard on excavated sites. A plant cover should be restored by seeding and mulching as soon after construction as possible.

The land capability classification is IIIe. The woodland ordination symbol is 3D.

42C—Clarksville very cherty silt loam, 3 to 9 percent slopes. This deep, gently sloping and moderately sloping, somewhat excessively drained soil is on narrow ridgetops and around the head of drainageways in the uplands. Areas generally are irregular in shape and range from 10 to more than 50 acres in size.

Typically, the surface layer is grayish brown, friable very cherty silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable very cherty silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is reddish brown, friable extremely cherty silty clay loam. The lower part is red, firm cherty clay. In some areas the soil has more sandstone fragments throughout and has boulders and stones on the surface. In places the lower part of the subsoil has less chert.

Included with this soil in mapping are areas of the moderately well drained Captina and Wilderness soils. These soils have a fragipan. They are near the center of ridgetops above the Clarksville soil. They make up about 10 percent of the unit.

Permeability is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. Surface runoff is medium. The available water capacity is low. Natural fertility also is low, and the organic matter content is moderately low. The surface layer is friable, but it cannot be easily tilled because of the high content of chert.

Most areas support native hardwoods. Some are used for pasture. This soil is suited to trees. Because of the content of chert, the equipment limitation and seedling mortality are management concerns. Hand planting or direct seeding may be needed. Planting container-grown nursery stock increases seedling survival rates. Selective thinning, removal of undesirable trees, and control of fire and grazing are needed. These measures improve the habitat for woodland wildlife, especially white-tailed deer and wild turkey.

This soil is well suited to cool-season and warm-season grasses, such as tall fescue, orchardgrass, Caucasian bluestem, and indiangrass. It is well suited to lespedeza and moderately suited to ladino clover and red clover. It is best suited to drought-tolerant grasses and deep-rooted legumes. Droughtiness and the very cherty surface layer are the main problems. Warm- and cool-season grasses grow well if pasture is managed properly. Individual pastures of cool-season and warm-season grasses used in a rotation grazing system should result in greater seasonal gains per animal than season-long grazing of any one grass species. The very cherty surface layer limits seedbed preparation. The best method of tillage is one in which a heavy disk is used. Broadcast seeding generally is needed. Proper stocking rates and timely deferment of grazing help to keep the pasture in the best condition.

This soil generally is not used for cultivated crops. The high content of chert and the low fertility are the main limitations.

This soil is suited to building site development and septic tank absorption fields. It generally is unsuitable, however, as a site for sewage lagoons because of seepage.

Frost action is a limitation if this soil is used as a site for local roads and streets. Grading the roads and streets so that they shed water and constructing adequate roadside ditches improve drainage and thus help to prevent the damage caused by frost action.

The land capability classification is IVs. The woodland ordination symbol is 3F.

42D—Clarksville very cherty silt loam, 9 to 14 percent slopes. This deep, strongly sloping, somewhat excessively drained soil is on side slopes and around the head of drainageways in the uplands. Areas generally are irregular in shape and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable very cherty silt loam about 2 inches thick. The subsurface layer is pale brown, friable very cherty silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown and brown, mottled, friable extremely cherty silty clay loam. The lower part is yellowish red, mottled, firm very cherty silty clay. In some areas the soil has sandstone fragments below the surface and boulders and stones on the surface. In places the lower part of the subsoil has less chert.

Included with this soil in mapping are areas of the moderately well drained Captina and Wilderness soils. Captina soils are on foot slopes and wide ridgetops. They have a surface layer of silt loam and a cherty fragipan. Wilderness soils are on shoulder slopes. They have a cherty fragipan and a cherty surface layer. Included soils make up about 10 percent of the unit.

Permeability is moderately rapid in the Clarksville soil. Surface runoff is medium. The available water capacity is low. Natural fertility also is low, and the organic matter content is moderately low. The surface layer is friable, but it cannot be easily tilled because of the high content of chert.

Most areas are used for timber. A few small areas are used for pasture. Because of the high content of chert, the slope, and the low fertility, this soil is unsuited to cultivated crops. It is suited to trees. The equipment limitation and seedling mortality are management concerns in the wooded areas. They are caused by the high content of chert. Hand planting or direct seeding may be needed. Planting container-grown nursery stock increases seedling survival rates. Selective thinning, removal of undesirable trees, and control of fire and grazing are needed. These measures improve the habitat for woodland wildlife, especially white-tailed deer and wild turkey.

This soil is suited to cool-season and warm-season grasses, such as tall fescue, Caucasian bluestem, and indiangrass. It also is suited to lespedeza and red clover. It is best suited to drought-tolerant grasses and deep-rooted legumes. Warm-season grasses grow well if the pasture is properly managed. Droughtiness, erosion, and the very cherty surface layer are the main management concerns. Individual pastures of cool-season and warm-season grasses used in a rotation grazing system should result in greater seasonal gains per animal than season-long grazing of any one grass species. The very cherty surface layer limits seedbed preparation. The best method of tillage is one in which a heavy disk is used. Broadcast seeding generally is needed. Timely tillage and a quickly established ground cover help to prevent excessive erosion. Proper stocking rates and timely deferment of grazing improve the pasture.

This soil generally is suitable for building site development and onsite waste disposal. The slope is a limitation on sites for dwellings and septic tank absorption fields. Dwellings should be designed so that they conform to the natural slope of the land. Some land shaping may be necessary. Installing the distribution lines in septic tank absorption fields across the slope helps to prevent downhill seepage. The soil generally is unsuitable as a site for sewage lagoons because of the slope and seepage.

The slope and the potential for frost action are limitations on sites for local roads and streets. The roads and streets should be designed so that they conform to the natural slope of the land. Some cutting and filling generally is needed. Adequate roadside ditches and culverts improve drainage and thus minimize the damage caused by frost action.

This soil is moderately limited as a site for lawns and landscaping because of the chert in the surface layer and the need for land shaping. Additions of topsoil generally are needed if lawns are to be established. Adding the topsoil in the spring or fall and establishing the lawn as soon after construction as possible minimize erosion.

The land capability classification is VIe. The woodland ordination symbol is 3F.

42F—Clarksville very cherty silt loam, 14 to 40 percent slopes. This deep, moderately steep to very steep, somewhat excessively drained soil is on convex side slopes in the uplands. Areas are irregular in shape and range from 10 to more than 150 acres in size.

Typically, the surface layer is brown, very friable very cherty silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown, friable very cherty silt loam. The next part is strong brown and yellowish red, firm very cherty silty clay loam. The lower part is multicolored, firm very cherty silty clay. In some areas the soil has sandstone fragments throughout. In other areas the slope is more than 40 percent. In places the lower part of the subsoil has less chert.

Included with this soil in mapping are areas of the moderately well drained Wilderness soils. These soils are on foot slopes and in concave areas. They have a fragipan. They make up about 10 percent of the unit.

Permeability is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. Surface runoff is rapid. The available water capacity is low. Natural fertility also is low, and the organic matter content is moderately low. The surface layer is friable, but it cannot be easily tilled because of the content of chert.

Most areas are used for native timber. A few are used for pasture. Because of the high content of chert, the slope, and the low fertility, this soil is unsuited to cultivated crops.

This soil is suited to trees. The equipment limitation and seedling mortality are management concerns in the wooded areas. Because of the content of chert, the slope, and large stones, hand planting may be necessary. Planting container-grown nursery stock increases seedling survival rates. The slope limits the use of harvesting equipment. Building logging roads and skid trails on the contour minimizes the steepness and length of slopes. In the steepest areas the logs should be yarded uphill to logging roads and skid trails. Selective thinning, removal of undesirable trees, and control of fire and grazing are needed. These measures improve the habitat for woodland wildlife, especially white-tailed deer and wild turkey.

This soil is moderately suited to cool-season and warm-season grasses, such as tall fescue, Caucasian bluestem, and indiangrass, and to legumes, such as lespedeza. Grasses and legumes can be grown for pasture in the less sloping, more accessible areas. The slope, summer droughtiness, and the high content of chert are the major problems in managing pasture. Establishing and maintaining a pasture can be difficult. Tilling should be avoided or kept to a minimum. Broadcasting or aerial seeding is needed. Proper stocking rates and timely deferment of grazing help to keep the pasture in the best condition. Effective brush control may be a continuing problem because the slope limits the use of equipment.

This soil generally is unsuitable for building site development and onsite waste disposal because of the slope and the content of coarse fragments.

The land capability classification is VIIe. The woodland ordination symbol is 3R.

62F—Irondale very cobbly silt loam, 14 to 40 percent slopes, extremely stony. This moderately deep, moderately steep to very steep, well drained soil is on the side slopes of mountains and peaks. Areas have rugged surface features and range from about 10 to more than 1,000 acres in size. Stones cover 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown, very friable very cobbly silt loam about 2 inches thick. The subsurface layer is brown, very friable very cobbly silt loam about 5 inches thick. The subsoil is about 23 inches thick. The upper part is yellowish brown and brown, friable very cobbly silt loam. The lower part is strong brown, friable extremely cobbly silt loam. Hard rhyolite bedrock is at a depth of about 35 inches. In places the depth to bedrock is less than 20 inches.

Included with this soil in mapping are several areas of a moderately deep soil on the wider divides; a narrow band of deep, stony soils along the lower part of the steeper slopes; and areas of a deep soil on the lower slopes. The moderately deep soil has fewer stones than the Irondale soil. The deep soil has a fragipan. Included soils make up about 10 to 15 percent of the unit. Also included are areas of Rock outcrop, which make up about 5 percent of the unit.

Permeability is moderate in the Irondale soil, and surface runoff is very rapid. The available water capacity is low. Natural fertility also is low, and the organic matter content is moderately low. This soil commonly cannot be tilled because it is too stony. Root development is restricted by the bedrock at a depth of about 35 inches.

Most areas support native timber. This soil is suited to trees. North- and east-facing slopes and sites on the lower slopes are more productive than other areas. The equipment limitation caused by the slope and stones, the erosion hazard, and seedling mortality are the major management concerns. Droughtiness is a limitation that cannot be easily overcome. As a result, north- and east-facing slopes are preferable sites for planting seedlings. Reinforcement planting, careful selection of species for planting, or the selection of container-grown nursery stock can increase seedling survival rates. The equipment limitation can be minimized by carefully locating logging roads and skid trails. Hand planting or direct seeding may be needed.

This soil is suited to native grasses for wildlife habitat, but overgrazing is a severe hazard. The soil is well suited to nature trails in scenic areas.

This soil generally is not used as a site for sanitary facilities or buildings because of the slope, the stones, and the moderate depth to bedrock.

The land capability classification is VIIs. The woodland ordination symbol is 2R.

70F—Gasconade-Rock outcrop complex, 14 to 50 percent slopes. This map unit occurs as areas of a shallow, strongly sloping to very steep, well drained Gasconade soil intermingled with areas of Rock outcrop. The unit is at the lower elevations on narrow ridgetops and side slopes in the uplands. Areas are irregular in shape and range from 10 to more than 80 acres in size. They are about 70 percent Gasconade soil and 15 percent Rock outcrop. The Gasconade soil and Rock outcrop occur as areas so intermingled that separating them in mapping was not practical.

Typically, the Gasconade soil has a surface layer of very dark grayish brown, firm cherty silty clay loam about 6 inches thick. The subsoil is about 8 inches thick. It is dark brown, firm very cherty silty clay in the upper part and brown, firm cherty clay loam in the lower part. Hard limestone bedrock is at a depth of about 14 inches.

The Rock outcrop consists of nearly horizontal exposures of sandy limestone. These exposures are a few square feet to several square yards in size and have vertical ledges. The ledges are several feet to more than 100 feet long and about 1 to 5 feet high.

Included in this unit in mapping are scattered small areas of moderately deep soils. These soils make up about 15 percent of the unit.

Permeability is moderately slow in the Gasconade soil, and surface runoff is rapid. The available water capacity is very low. Natural fertility is medium, and the organic matter content is moderate. Because of the shallowness to bedrock and the Rock outcrop, tillage is impractical. Root development is restricted by the bedrock at a depth of about 14 inches. The shrink-swell potential is moderate.

Most areas are used as wildlife habitat. Warm-season grasses survive better than other plants because they can grow during hot summer months, when an insufficient moisture supply is common.

The Gasconade soil is poorly suited to trees because of the shallowness to bedrock and the droughtiness; however, eastern redcedar grows well on this soil. The use of tree-planting and site-preparation equipment is limited. Commercial timber management generally is not feasible because of low production.

The Gasconade soil is poorly suited to building site development and onsite sewage disposal because of the shallowness to bedrock, seepage, and large stones. Some areas, however, can be used as building sites. The bedrock can be excavated by blasting. The bedrock and the large stones are limitations on sites for local roads and streets. Building the roads across the slope minimizes the need for excavation. Subgrade material can be hauled in or the bedrock blasted out.

The land capability classification is VIIs. The woodland ordination symbol is 2R.

76C—Poynor very cherty silt loam, 3 to 9 percent slopes. This deep, gently sloping and moderately sloping, well drained soil is in saddles, on foot slopes, and on narrow ridges below highly dissected landforms. Areas are irregular in shape and range from 10 to 75 acres in size.

Typically, the surface layer is dark grayish brown, friable very cherty silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish red, firm very cherty silty clay loam. The next part is red, firm clay. The lower part is red, mottled, very firm clay. In places sandstone fragments and quartzite stones are on the surface and in the upper part of the subsoil. In some areas the lower part of the subsoil has more chert and less clay.

Included with this soil in mapping are small areas where slopes are short and steep and stones are on the surface. Also included are the moderately well drained Captina and Wilderness soils, both of which have a fragipan. Captina soils are in landscape positions above the Poynor soil. Wilderness soils are in the less sloping areas near the middle of the wider divides and on narrow foot slopes. Included soils make up about 15 percent of the unit.

Permeability is moderate in the Poynor soil, and surface runoff is medium. The available water capacity is low. Natural fertility and the organic matter content also are low

Most areas support native hardwoods and scattered pine. This soil generally is not used for cultivated crops. It is suited to trees. No major hazards or limitations affect planting or harvesting in wooded areas. Selective harvesting of mature trees, thinning of second-growth stands, removal of cull trees, and control of fire and grazing are needed. These measures improve the habitat for most kinds of woodland wildlife.

This soil is moderately suited to lespedeza, tall fescue, and warm-season grasses, such as Caucasian bluestem, big bluestem, and little bluestem. Because of the droughtiness and the high content of chert, establishing pasture species is difficult. In the more accessible areas, haying is feasible. Tillage generally should be avoided unless the larger stones are removed. Broadcasting or aerial seeding is needed. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in the best condition. Effective brush control may be a continuing problem after the timber is cleared.

Sealing of the ponds used for watering livestock is necessary. The ponds can be easily sealed if they are constructed during periods when rainfall is timely. The clayey material is never completely air dried during these periods. The entire excavation should be disked several times and then compacted with a sheepsfoot roller.

This soil is suited to building site development and properly installed septic tank absorption fields. The shrink-swell potential is a limitation on sites for dwellings with basements. The damage caused by shrinking and swelling can be minimized by using adequately reinforced concrete in footings and walls and installing drainage tile around the footings. Properly grading local roads and constructing adequate roadside ditches improve drainage and thus minimize the road damage caused by frost action.

The land capability classification is IVs. The woodland ordination symbol is 3A.

76D—Poynor very cherty silt loam, 9 to 14 percent slopes. This deep, strongly sloping, well drained soil is on uneven foot slopes, in saddles, and on the narrow tops of low ridges in the uplands. Areas are irregular in shape and range from 10 to 150 acres in size.

Typically, the surface layer is brown, friable very cherty silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable very cherty silt loam about 3 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish red and strong brown, firm very cherty silty clay loam. The lower part is red, very firm clay. In some places the upper part of the subsoil has more clay and less chert. In other places the lower part of the subsoil has more chert and less clay.

Included with this soil in mapping are a few areas of the gently sloping and steep Poynor soils and some areas of the moderately well drained Wilderness soils. Wilderness soils have a fragipan. They are on ridgetops and the lower foot slopes. Included soils make up about 10 percent of the unit.

Permeability is moderate in this Poynor soil, and surface runoff is rapid. The available water capacity is low. Natural fertility and the organic matter content also are low.

Most areas support native hardwoods and scattered pine. Because of the slope, droughtiness, and the high content of coarse fragments, this soil is unsuited to cultivated crops. It is suited to trees. No major hazards or limitations affect planting or harvesting in the wooded areas. Selective harvesting of mature trees, thinning of second-growth stands, removal of cull trees, and contro of fire and grazing are needed. These measures improve the habitat for most kinds of woodland wildlife.

This soil is moderately suited to lespedeza, tall fescue, and warm-season grasses, such as Caucasian bluestem and indiangrass. Establishing and maintaining a pasture can be difficult. Erosion, the high content of chert in the surface layer, and the droughtiness are the main management problems. A heavy disk may be needed for seedbed preparation. Tillage generally should be avoided because of the hazard of erosion. Broadcasting or aerial seeding is needed. Overgrazing reduces forage production and increases the extent of weeds. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in the best condition. Effective brush control may be a continuing problem because the slope, the content of chert, and the stones limit use of equipment in the steeper areas.

Sealing of the ponds used for watering livestock is necessary. The ponds can be easily sealed if they are constructed during periods when rainfall is timely. The clayey material is never completely air dried during these periods. The entire excavation should be disked several times and then compacted with a sheepsfoot roller.

This soil generally is not used as a site for sanitary facilities or buildings because of the slope. Extensive grading generally is necessary on sites for septic tank absorption fields, and leveling may be needed on sites for sewage lagoons.

The land capability classification is VIe. The woodland ordination symbol is 3A.

76F—Poynor very cherty silt loam, 14 to 40 percent slopes. This deep, moderately steep to very steep, well drained soil is on uneven side slopes and head slopes in the uplands. Individual areas are irregularly shaped and range from 20 to 500 acres in size.

Typically, the surface layer is very dark grayish brown, friable very cherty silt loam about 2 inches thick. The subsurface layer is brown, friable very cherty silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown, firm very cherty silty clay loam. The next part is yellowish red, firm extremely cherty silty clay loam. The lower part is red, firm clay. In some places the upper part of the subsoil has more clay and less chert. In other places the lower part of the subsoil has more chert and less clay.

Included with this soil in mapping are areas of the moderately well drained Wilderness soils. These soils have a fragipan. They are on ridgetops and the lower side slopes. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Poynor soil, and surface runoff is rapid. The available water capacity is low. Natural fertility and the organic matter content also are low.

Most areas support native hardwoods. Because of the slope, droughtiness, and the content of coarse fragments, this soil is unsuited to cultivated crops. It is suited to trees. The erosion hazard and the equipment limitation are management concerns in the wooded areas. Careful selection of sites for logging roads and skid trails is needed. Seeding disturbed areas after the trees are harvested helps to control erosion. Hand planting or direct seeding may be needed. North- and east-facing slopes are preferable sites for planting. Seedling mortality rates on south- and west-facing slopes can be reduced by planting tree species that are tolerant of dry, warm sites. Reinforcement planting or the selection of container-grown nursery stock for planting increases seedling survival rates. Selective harvesting of mature trees, thinning of second-growth stands, removal of cull trees, and control of fire and grazing are needed. These measures improve the habitat for most kinds of woodland wildlife.

This soil is moderately suited to lespedeza, tall fescue, and warm-season grasses, such as Caucasian bluestem and indiangrass. Establishing and maintaining a pasture can be difficult. Erosion, the chert fragments in the surface layer, and droughtiness are the main management concerns. A crawler tractor and a heavy disk may be needed for seedbed preparation. Tillage generally should be avoided. Broadcasting or aerial seeding is needed. Overgrazing reduces forage production and increases the extent of weeds. Proper stocking rates, pasture rotation, and timely deferment of grazing improve the pasture. Effective brush control may be a continuing problem because the slope limits the use of equipment.

Sealing of the ponds used for watering livestock is necessary. The ponds can be easily sealed if they are constructed during periods when rainfall is timely. The clayey material never completely air dries during these periods. The entire excavation should be disked several times and then compacted with a sheepsfoot roller.

This soil generally is not used as a site for sanitary facilities or buildings because of the slope.

The land capability classification is VIIe. The woodland ordination symbol is 3R.

80C—Wilderness very cherty silt loam, 3 to 9 percent slopes. This deep, gently sloping and moderately sloping, moderately well drained soil is on ridges and toe slopes in the uplands. Individual areas are narrow and winding and range from 10 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable very cherty silt loam about 5 inches thick. The upper part of the subsoil is brown, friable very cherty silt loam and firm extremely cherty silty clay loam. The lower part to a depth of 60 inches or more is a firm and brittle fragipan of very pale brown extremely cherty silt loam, strong brown extremely cherty silty clay loam, and multicolored very cobbly sandy loam.

Included with this soil in mapping are small areas of Captina and Clarksville soils. Captina soils are not cherty above the fragipan. Clarksville soils do not have a fragipan. Both of the included soils are on narrow ridgetops and in saddles between ridges. They make up about 10 to 15 percent of the unit.

Permeability is moderate in the upper part of the Wilderness soil and slow in the fragipan. Surface runoff is medium. The available water capacity is low. Natural fertility and the organic matter content also are low. A perched water table is at a depth of 1 to 2 feet during most late winter and early spring months. Root development is severely limited by the fragipan at a depth of 18 to 24 inches.

Because of droughtiness and low fertility, this soil generally is not used for cultivated crops or small grain. It is suited to lespedeza, tall fescue, and warm-season grasses, such as big bluestem and indiangrass. Droughtiness, the very cherty surface layer, and the shallow root zone are severe limitations. Warm- and cool-season grasses grow moderately well if the pasture is managed properly. Individual pastures of cool-season and warm-season grasses used in a rotation grazing system should result in greater seasonal gains per animal than season-long grazing of any one grass species. The best method of tillage is one in which a heavy disk is used. Broadcast seeding generally is needed. Proper stocking rates and timely deferment of grazing improve the pasture.

Most areas support native timber. This soil is suited to trees. Seedling mortality and windthrow are serious management concerns. Timely thinning and harvesting of mature trees reduce the hazard of windthrow. Reinforcement planting or the selection of container-grown nursery stock for planting increases seedling survival rates.

This soil is suited to building site development and onsite waste disposal. Seasonal wetness is a severe limitation on sites for dwellings and septic tank absorption fields. Properly designing buildings and installing tile drains around footings and foundations help to prevent the damage caused by excessive wetness. The soil is suitable as a site for sewage lagoons, but the slope is a limitation in the more sloping areas. This limitation can be overcome by properly designing the lagoon and by leveling the site.

This soil is suited to local roads and streets. Wetness and frost action are limitations. Grading the roads so that they shed water, constructing adequate roadside ditches, and installing culverts help to prevent the damage caused by wetness and frost action.

The land capability classification is IVs. The woodland ordination symbol is 3D.

81D—Wilderness-Clarksville complex, 9 to 14 percent slopes. These deep, strongly sloping soils are on side slopes along the major drainageways in the uplands. The Wilderness soil is moderately well drained, and the Clarksville soil is somewhat excessively drained. Areas are irregularly shaped or are long and narrow. They range from 10 to more than 100 acres in size. They typically are about 50 percent Wilderness soil and 50 percent Clarksville soil. The composition varies from area to area. The two soils occur as areas so intricately mixed that separating them in mapping was not practical.

Typically, the surface layer of the Wilderness soil is brown, friable cherty silt loam about 4 inches thick. The subsurface layer is light yellowish brown, friable cherty silt loam about 6 inches thick. The upper part of the subsoil is strong brown, firm extremely cherty silty clay loam. The next part is a brittle, firm fragipan of strong brown extremely cherty silty clay loam. The lower part to a depth of 60 inches or more is yellowish brown, firm extremely cherty silty clay.

Typically, the surface layer of the Clarksville soil is dark grayish brown, very friable very cherty silt loam about 2 inches thick. The subsurface layer is pale brown, friable very cherty silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown, firm very cherty silty clay loam in the upper part and strong brown and yellowish red, firm cherty clay in the lower part.

Permeability is moderate in the upper part of the Wilderness soil and slow in the fragipan. It is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. Surface runoff is rapid on both soils. The available water capacity is low. The organic matter content is low in the Wilderness soil and moderately low in the Clarksville soil. Natural fertility is low in both soils. A perched water table is at a depth of 1 to 2 feet in the Wilderness soil. Root development is limited by the fragipan at a depth of about 18 inches in the Wilderness soil.

These soils are unsuited to cultivated crops and generally are not used for pasture because of the low fertility, the slope, and droughtiness. Cool-season grasses and legumes are grown for pasture only in a few areas. Warm-season grasses grow better but are used mainly as wildlife habitat elements.

Most areas support native timber. These soils are suited to trees. The equipment limitation and seedling mortality are the major management concerns on both soils. The windthrow hazard is a management concern on the Wilderness soil. It is caused by a shallow rooting depth. Hand planting generally is necessary. Reinforcement planting or the selection of container-grown nursery stock for planting increases seedling survival rates. Timely thinning and harvest of mature trees and periodic culling of undesirable trees reduce the hazard of windthrow.

These soils generally are suited to building site development and onsite waste disposal. The wetness and restricted permeability of the Wilderness soil and the slope of both soils are limitations. Installing drainage tile around footings and basement walls minimizes the damage caused by excessive wetness. Dwellings should be designed so that they conform to the natural slope of the land. Otherwise, excessive land shaping is necessary. Septic tank absorption fields cannot function adequately on the Wilderness soil. They can function on the Clarksville soil if they are designed so that they conform to the topography. Sewage lagoons can function properly on both soils if the site is leveled and seepage is controlled by sealing the bottom and berms of the lagoon.

These soils are suited to local roads and streets. The wetness, the potential for frost action, and the slope are limitations. Grading the roads so that they shed water, constructing adequate roadside ditches, and installing culverts improve drainage and thus minimize the damage caused by wetness and frost action. Some cutting and filling may be necessary because of the slope.

The land capability classification is VIe. The woodland ordination symbol assigned to the Wilderness soil is 3D, and that assigned to the Clarksville soil is 3F.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture.

It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

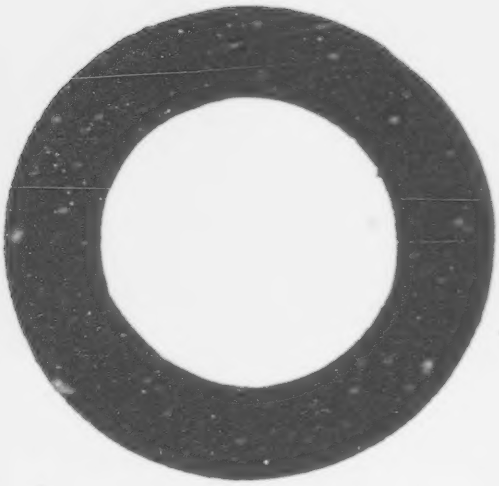
Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 7,000 acres in the survey area, or 3 percent of the total acreage, meets the soil requirements for prime farmland. About 5,000 acres of this prime farmland is used for pasture and hay. Only a few areas are used for cultivated crops.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table qualify for prime farmland only in areas where this limitation has been overcome by drainage measures. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not this limitation has been overcome by corrective measures.



Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1987, about 7,000 acres in the survey area, or 3 percent of the total acreage, was used for crops. Of this total, about 5,000 acres was used for permanent pasture; 1,000 acres for grain sorghum and wheat; and 1,000 acres for rotation hay and pasture. A small acreage is used for cash crops, such as corn or soybeans.

During the livestock market fluctuations of the 1970's, some old fields reverted to trees and brush and became fairly good wildlife areas.

In many areas of cropland, erosion exceeds the levels allowable for sustainable agricultural production. On most areas of cropland, a conservation tillage system designed for specific sites can control erosion.

Cherty or stony soils, which make up much of the survey area, are used as woodland. The soils in the less sloping areas on uplands have a surface layer of silt loam about 15 to 24 inches deep over a fragipan. They are the main upland soils used for crops or for pasture and hay.

Erosion is the major hazard on most of the upland soils used as cropland. Moving water is highly erosive in areas of these soils because of the silt loam surface layer. If the soil is cultivated year after year, erosion is excessive in areas where the slope is more than about 3 percent or where the erodible surface layer overlies a slowly permeable fragipan, or both.

Loss of the surface layer reduces fertility and the available water capacity and results in poor tilth. Captina soils have a fragipan and are highly erodible.

Clarksville soils have a very cherty surface layer and are not so erodible. Applications of fertilizer and lime can improve the fertility of eroded soils, but erosion results in many irretrievable losses. Controlling erosion helps to keep the soil in place and thereby minimizes the sedimentation of streams and ponds. Water quality is thus improved for farm and city uses and for wildlife habitat and recreation areas.

Erosion-control practices protect the surface and reduce the runoff rate. Under proper management, more than 80 percent of permanent pasture or hayland is adequately protected against erosion. If cultivation does not disturb the crop residue left on the surface, soil losses can be kept within tolerable limits. Compared to fall plowing with a moldboard plow, a conservation tillage system that does not invert the soil and that leaves a protective cover of crop residue on the surface throughout the year can reduce sheet erosion by half or more. The conservation tillage system can consist of shredding corn stalks and then chisel plowing in spring to prepare a seedbed and using crop residue to cover about 20 percent of the surface after planting.

Nearly all soils on uplands are acid to strongly acid in the root zone. Applications of agricultural lime are needed to raise the pH level of the soils for good growth of most field or pasture plants. The applications of fertilizer and lime should be based on the results of soil tests, the needs of the crops, and the expected level of yields. The Cooperative Extension Service can help to determine the kind and amount of fertilizer and lime to be applied.

Flooding is a severe hazard on soils along the major streams and rivers. Midco soils typically are on the upper reaches of all flood plains along the major tributaries as well as those of the Current River. These areas are frequently flooded. Secesh soils and Elk and Gladden soils at the lower elevations are occasionally flooded, generally from about December to May. In some of the higher areas, Elk soils are subject to rare flooding. Along the Current River, Wideman soils are frequently flooded.

Tall fescue, a cool-season grass, is the most common pasture grass in the county. It grows mainly in spring and fall. A few areas are planted to warm-season grasses, which grow mainly in summer. The most productive species are switchgrass, little bluestem planted with some indiangrass, and big bluestem. Red clover, white Dutch clover, and lespedeza are the main clover species. They are commonly planted either in pure stands or with grasses and are used for hay and pasture. White Dutch clover and lespedeza are more commonly grown in mixed stands with tall fescue.

Well managed stands of forage plants are effective in controlling erosion. Applications of lime and fertilizer are needed. They should be based on the results of soil tests, the needs of the plants, and the desired level of yields. Overgrazing is a management concern. It reduces the vigor of the plants and forage production. It also allows weedy and brushy species to invade and to increase in extent. Common weedy species that increase in extent are broomsedge bluestem and wooly plantain. Rotation grazing, measures that maintain fertility, timely deferment of grazing, and proper stocking rates help to prevent overgrazing. Deferred grazing provides a rest period during which the plants can build up carbohydrate reserves. Rotation grazing among several areas of pasture provides a rest period for each area. The information in table 6 can help in estimating the number of animal units a given pasture can support.

Strawberries are grown commercially on a small acreage in the county. The county has a few Christmas tree plantations, and roadside produce stands are becoming more common. Other specialty crops that could be grown are blueberries, peaches, apples, vegetables, nuts, grapes, and nursery plants. These crops are not grown commercially, however, because of the distance to markets.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit *(6)*. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclass indicated by *w* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

James L. Robinson, forester, Soil Conservation Service, helped prepare this section.

Approximately 83 percent of the nonfederal land area in Carter County is forest land *(8)*.

Knowledge of soils helps to provide a basic understanding of how forest types develop and tree growth occurs. Some of these relationships have been recognized for a long time. For example, white oak grows well on deep moist soils and hickories, post oak, and chinkapin oak are more prevalent where the rooting depth or the moisture supply is limited. The soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. Soil properties that directly or indirectly affect growth requirements include reaction, fertility, drainage, texture, structure, and depth.

Texture, rooting depth, and the content of stones, shale, and chert have major effects on the available water capacity. Deep silt loams have a high available water capacity. Clarksville and most upland soils in the county have a high content of chert and thus a low available water capacity. The depth to bedrock affects the amount of available water in Gasconade soils. It also restricts root development. These limitations reduce the productive potential on many sites in the county. Although management practices can do little to overcome these limitations, managing the best suited species can lessen the adverse effects of the limitations.

The supply of nutrients has an important effect on tree growth. On many upland soils, the subsoil is leached and contains few nutrients. In most of the soils on bottom land, the substratum has a greater amount of nutrients.

The layer of leaf litter on the surface of the soil also affects tree growth. This layer accumulates in the forest ecosystem over long periods. The decomposition of this layer recycles nutrients. Fire, excessive trampling by livestock, and erosion can result in the loss of these nutrients. Forest management should include the prevention of wildfires and overgrazing.

Site characteristics that affect tree growth include aspect and position on the landscape. These characteristics influence such factors as the amount of available sunlight, air drainage, soil temperature, and moisture relations. Generally, north- and east-facing slopes are the best upland sites for tree growth.

Forest cover is significant in all the soil associations in the county. The upland forested areas, called the "Ozarks," support species common to the oak-hickory and oak-pine cover types. The most common species are white oak, northern red oak, shortleaf pine, black oak, post oak, chinkapin oak, white ash, hickories, scarlet oak, elm, and black walnut.

The Captina-Clarksville-Wilderness association produces a typical upland forest. Under good management, Clarksville, Captina, and Poynor soils on north and east aspects produce good-quality oak timber. White oak and northern red oak typically are dominant on these slopes.

In areas of Captina and Wilderness soils on south- and west-facing slopes and on the ridgetops, the sites typically are drier and support slower growing, lower quality hardwoods. The better sites support scarlet oak, black oak, and mockernut hickory, and hickories, winged elm, and shortleaf pine are predominant. Management generally should favor shortleaf pine (fig. 8) and scarlet oak in existing stands. In many areas the trees are of poor quality and have a marginal growth potential. Only low-intensive management is warranted in these marginal stands. These sites, however, can be managed for shortleaf pine.

The Irondale-Clarksville associaton is at the highest elevations in the county. The Clarksville and Poynor soils in this association support timber similar to that in the other associations. The Irondale soils generally cannot produce good-quality commercial timber. Common plant species include post oak, winged elm, blackjack oak, eastern redcedar, sumac, coralberry,

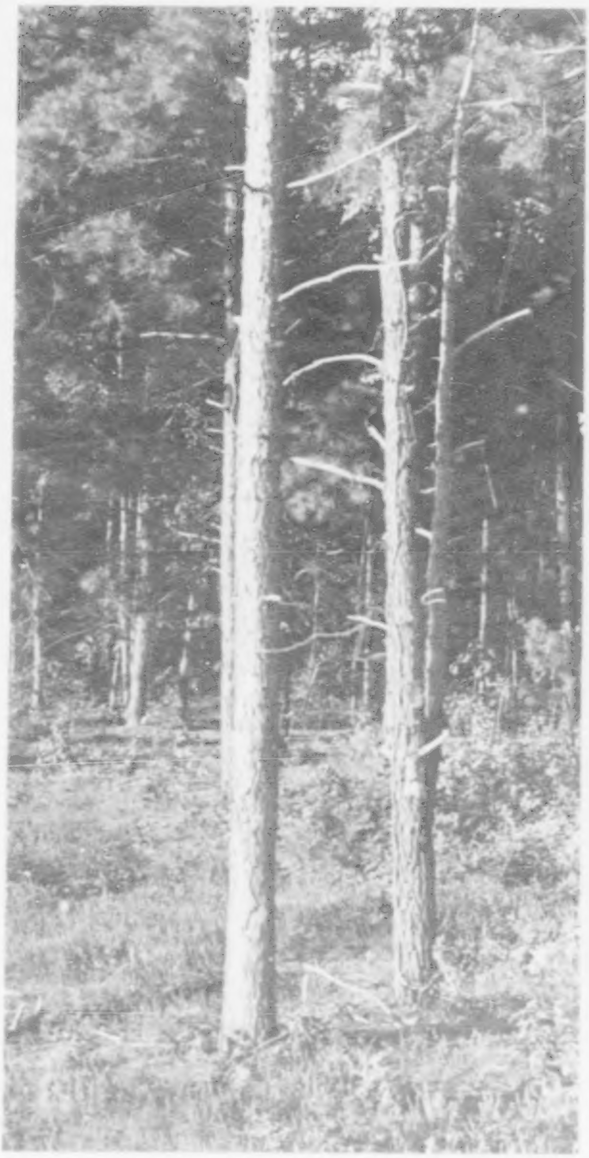


Figure 8.—Shortleaf pine on Captina silt loam, 5 to 9 percent slopes.

native grasses, and wildflowers.

The minor Midco, Elk, Gladden, Secesh, and Wideman soils are on bottom land and terraces along the streams and tributaries in all the associations. These soils support stands of northern red oak, white oak, black walnut, sycamore, ash, hackberry, and elm. The management practices required are similar on all these soils, and potential productivity is good or excellent.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *L*, low strength. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and L.

In table 7, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed also are subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions help to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict the use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and the slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Pat Graham, biologist, Soil Conservation Service, helped prepare this section.

The natural beauty of Carter County has remained virtually unchanged since the pioneer days. The population density is low, and there are few large towns. Carter County is in one of the best regions of Missouri for the enjoyment of outdoor activities, such as camping, picnicking (fig. 9), hiking, sightseeing, and canoeing.

The Current River is a key element in the county's beauty. Big Spring, near Van Buren, is America's largest single-outlet spring. It is a major source of water for the Current River and yields as much as 846 million gallons of water a day. The Ozark National Scenic Riverways protects the Current River. The river bisects the county and provides an ideal setting for canoeing and fishing (fig. 10).

A large part of southwestern Carter County, as well as part of the eastern border, consists of public lands in the Mark Twain National Forest. This land is open to the public for such activities as hiking, camping, and hunting. Turkey and deer hunting is moderately successful in the county.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements

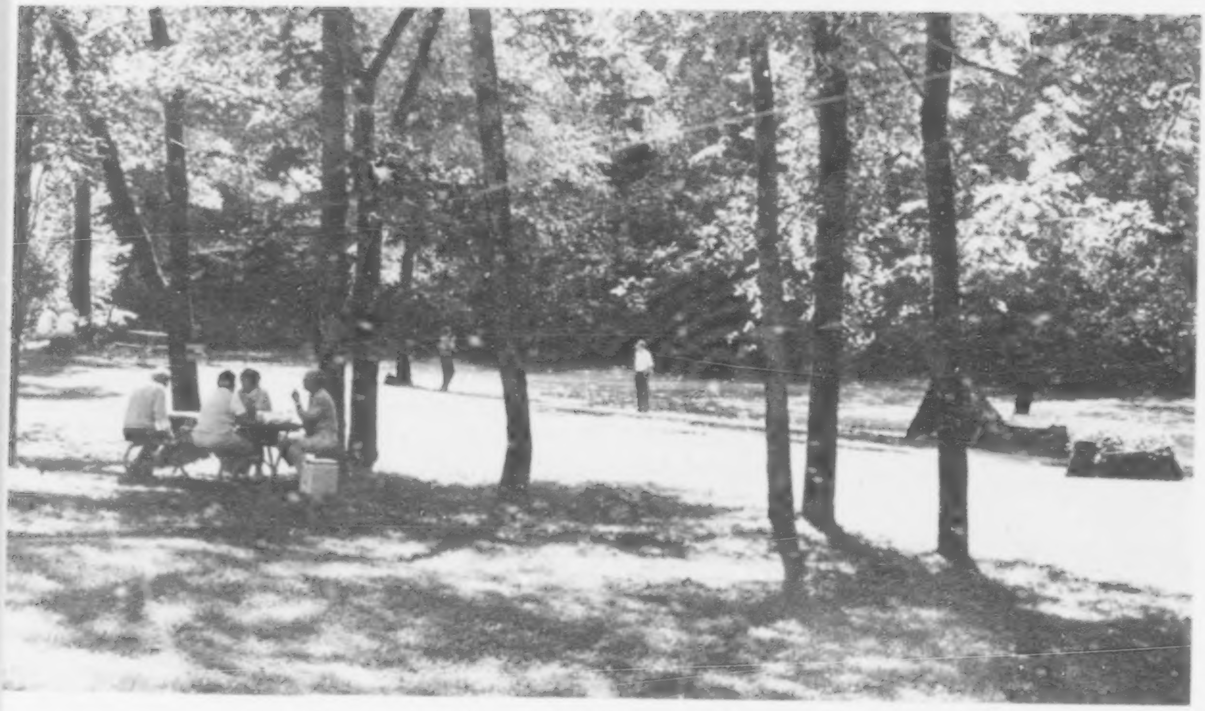


Figure 9.—A picnic area along the Current River in Big Spring Park.

and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Figure 10.—The Current River is the most popular canoeing stream in Missouri.

Wildlife Habitat

Pat Graham, biologist, Soil Conservation Service, helped prepare this section.

Carter County is located in the part of the state known as the Ozark Plateau. There are three broad divisions: (1) the high, sparsely wooded part of the plateau, which is the source of most streams; (2) the part of the plateau characteristically wooded with the oak-hickory cover type interspersed with shortleaf pine; and (3) the river and stream bottom land, which includes the best farmland in the region and which has been cleared in many areas.

Most of the original oak and hickory stands have been cut down and burned over. At present, the county is about 83 percent forest land, 14 percent grassland, and 3 percent cropland. Grassland has changed from mixed prairie grasses and forbs to cool-season grasses, the most common of which is tall fescue. The forest land typically consists of pole-sized oak-hickory stands with a closed canopy and generally does not have a diverse, well developed understory. Only a few areas provide suitable edge habitat and other interspersed cover types (fig. 11). The great expanses of unbroken woodland provide an important interior woodland wildlife habitat but provide a lower quality habitat to the many species that live in edge areas.

Over 180 species of fish and wildlife inhabit Carter

County. About 70 percent of these are nongame species, the most typical of which are downy woodpecker, tufted titmouse, ovenbird, common nighthawk, and wood frogs. The most common game species are white-tailed deer, wild turkey, gray squirrel, raccoon, red fox, and gray fox.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, soybeans, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, switchgrass, orchardgrass, red clover, white clover, alfalfa, and lespedeza.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, foxtail, croton, and partridge pea.

Hardwood trees and woody understory produce nuts or other fruits, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, wild plum, sumac, and persimmon.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland,

Figure 11.—A park that furnishes edge habitat for wildlife.

pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, herons, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations.

For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, the shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, the slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and the slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 12). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

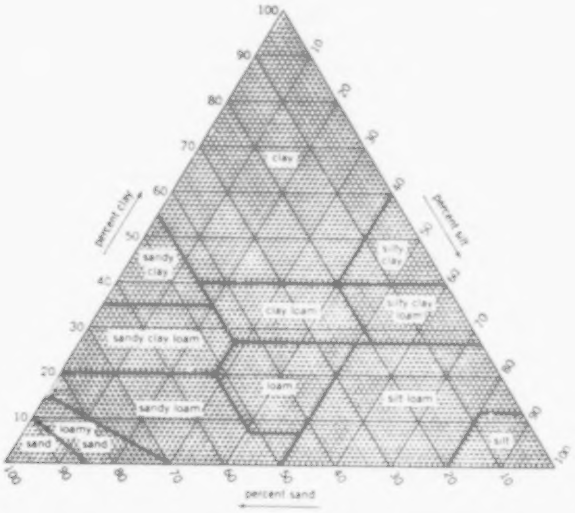


Figure 12.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17. Only saturated zones within a depth of about 6 feet are indicated.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, wate table is separated from a lower one by a dry zone.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(7)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Paleudults (*Pale*, meaning excessive development, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Paleudults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, siliceous, mesic Typic Paleudults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (5)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (7)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Auxvasse Series

The Auxvasse series consists of deep, somewhat poorly drained soils on low terraces along the larger streams. These soils formed in alluvium. Permeability is very slow. Slopes range from 0 to 3 percent.

Typical pedon of Auxvasse silt loam, 0 to 3 percent slopes, 2,250 feet north and 500 feet east of the southwest corner of sec. 9, T. 27 N., R. 3 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; moderate fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

E—7 to 14 inches; light gray (10YR 7/2) silt loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

Btg1—14 to 21 inches; light brownish gray (10YR 6/2) silty clay; many medium and coarse prominent strong brown (7.5YR 5/6) and many medium prominent yellowish brown (10YR 5/6) mottles; gray silt coatings in the upper 2 inches; weak medium prismatic structure parting to moderate fine subangular blocky; very firm; few faint clay films on faces of peds; few fine and medium roots; very strongly acid; clear smooth boundary.

Btg2—21 to 34 inches; gray (10YR 5/1) clay; common medium and coarse prominent yellowish red (5YR 5/6) and common fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; very firm; few fine roots; common distinct clay films on faces of peds; clay films along root channels; few fine chert fragments; neutral; clear smooth boundary.

BCg—34 to 45 inches; dark gray (10YR 4/1) silty clay; weak medium prismatic structure parting to weak fine subangular blocky; very firm; few fine roots; common distinct clay films on faces of peds; few fine concretions of iron and manganese oxide; mildly alkaline; gradual smooth boundary.

Cg—45 to 60 inches; light gray (10YR 7/1) silty clay loam; many medium and coarse prominent yellowish brown (10YR 5/6) mottles; massive; firm; common clay flows along old root channels; few fine angular chert fragments and rounded pebbles; mildly alkaline.

The A or Ap horizon has value of 4 or 5 and chroma of 1 or 2. The Bt horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 or 2.

Captina Series

The Captina series consists of deep, moderately well drained soils on uplands. These soils formed in a thin layer of loess and in cherty sediments. They have a fragipan. Permeability is moderate in the upper part of the profile and slow in the fragipan. Slopes range from 2 to 9 percent.

Typical pedon of Captina silt loam, 2 to 5 percent slopes, 2,200 feet south and 800 feet west of the northeast corner of sec. 22, T. 26 N., R. 3 E.

A—0 to 5 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; many fine and medium roots; common fine pores; common worm channels and casts; very strongly acid; clear wavy boundary.

BE—5 to 12 inches; yellowish brown (10YR 5/4 and 5/6) silt loam; weak fine subangular blocky structure; friable in the E part, firm in the B part; common fine and medium roots; common fine pores; common worm channels; few fine pieces of carbonized material; very strongly acid; gradual smooth boundary.

Bt—12 to 26 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium roots; few faint clay films on faces of peds; common fine pores; few worm channels and casts; very pale brown (10YR 7/3) silt loam in old root channels; extremely acid; clear wavy boundary.

Bx1—26 to 30 inches; light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) silty clay loam; moderate fine subangular blocky structure; brittle in place; firm; few fine roots; few fine pores; about 10 percent chert fragments; extremely acid; abrupt wavy boundary.

Bx2—30 to 36 inches; mottled brownish yellow (10YR 6/6), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2) very cherty silty clay loam; moderate fine subangular blocky structure; brittle in place; firm; about 60 percent chert fragments; extremely acid; clear wavy boundary.

Bx3—36 to 60 inches; mottled light olive brown (2.5Y 5/6), strong brown (7.5YR 4/6), and grayish brown (10YR 5/2) very cherty silty clay loam; brittle in place; chert-controlled structure; firm; thick clay flows along polygonal structure lines; about 60 percent chert fragments; extremely acid.

Depth to the fragipan ranges from 16 to 28 inches. In uncultivated areas the A horizon has chroma of 2 or 3. The content of chert in this horizon ranges from 0 to 5 percent. The BE horizon has hue of 10YR or 7.5YR and chroma of 4 to 6. It is silt loam or silty clay loam. The Bt

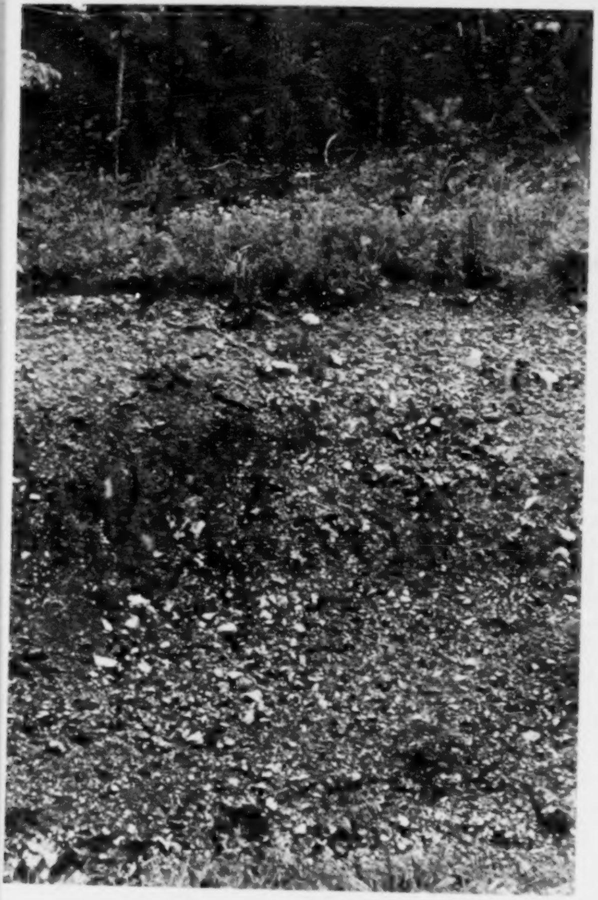


Figure 13.—Typical profile of a Clarksville soil in a roadcut.

horizon has hue of 10YR or 7.5YR and chroma of 4 to 8. The Bx horizon is mottled with hue of 7.5YR to 2.5YR and chroma of 2 or 8 and shades of gray and yellowish red. It is silt loam, silty clay loam, or the cherty or very cherty analogs of those textures. The content of chert in this horizon ranges from 10 to 60 percent.

Clarksville Series

The Clarksville series consists of deep, somewhat excessively drained soils on uplands. These soils formed in cherty limestone residuum (fig. 13). Permeability is moderately rapid in the upper part of the profile and moderate in the lower part. Slopes range from 3 to 40 percent.

Typical pedon of Clarksville very cherty silt loam, 14 to 40 percent slopes, 1,585 feet south and 1,650 feet west of the northeast corner of sec. 1, T. 25 N., R. 3 E.

A—0 to 4 inches; brown (10YR 5/3) very cherty silt loam, light gray (10YR 7/2) dry; weak fine granular structure; very friable; many fine roots; many pores; about 50 percent chert fragments; very strongly acid; abrupt smooth boundary.

BE—4 to 8 inches; strong brown (7.5YR 5/6) very cherty silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; common small pores; about 60 percent chert fragments; very strongly acid; clear smooth boundary.

Bt1—8 to 21 inches; strong brown (7.5YR 5/6) very cherty silty clay loam; moderate fine subangular structure; firm; many fine roots; common fine pores; few faint clay films on faces of peds; about 40 percent chert fragments; very strongly acid; clear smooth boundary.

Bt2—21 to 34 inches; yellowish red (5YR 5/6) very cherty silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common faint clay films on faces of peds and in pores; about 60 percent chert fragments; very strongly acid; clear smooth boundary.

Bt3—34 to 49 inches; yellowish red (5YR 5/6) very cherty silty clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine roots; many distinct clay films on faces of peds; about 60 percent chert fragments; very strongly acid; clear smooth boundary.

Bt4—49 to 60 inches; variegated yellowish red (5YR 5/6), pale brown (10YR 6/3), and reddish brown (5YR 5/4) very cherty silty clay; moderate medium subangular blocky structure; firm; common fine roots; common prominent clay films on vertical faces of peds; about 40 percent chert fragments; very strongly acid.

The coarse fragments are mainly chert, but some are sandstone and quartzite fragments. The chert fragments generally range from 2 millimeters to 4 inches in size, but some are larger.

The A horizon has value of 2 to 6 and chroma of 2 or 3. It is cherty or very cherty analogs of silt loam or loam. The content of chert in this horizon ranges from 30 to 60 percent. Some pedons have an E horizon, which has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. The upper part of the Bt horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 6. It is very cherty silty clay loam or very cherty silt loam. The content of chert in this part of the horizon ranges from 35 to 60 percent. The lower part of the Bt horizon has hue of 10YR to 2.5YR, value of 3 to 6, and chroma of 4 to 6. It is the very cherty or extremely cherty analogs of silty clay or clay. The content of chert in this part of the horizon ranges from 35 to 75 percent.

Elk Series

The Elk series consists of deep, well drained, moderately permeable soils on high flood plains along the larger streams and their major tributaries. These soils formed in silty alluvium. Slopes range from 1 to 4 percent.

Typical pedon of Elk silt loam, 1 to 4 percent slopes, 925 feet south and 1,950 feet east of the northwest corner of sec. 14, T. 26 N., R. 3 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; very friable; many fine roots; few fine pores; many worm channels and casts; slightly acid; abrupt smooth boundary.

A—6 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine and medium roots; common fine pores; common worm channels; strongly acid; clear smooth boundary.

Bt1—10 to 28 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable; many fine roots; common fine pores; few worm channels; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—28 to 40 inches; strong brown (7.5YR 5/6) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many fine pores; few worm channels; few faint clay films on faces of peds and in channels; few fine pebbles; very strongly acid; abrupt smooth boundary.

C—40 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct very pale brown (10YR 7/3) mottles; massive; firm; about 10 percent fine chert fragments; few fine roots; few fine iron and manganese masses; few faint clay films on pebbles; very strongly acid.

The A and Bt horizons contain less than 3 percent chert fragments. The C horizon contains less than 15 percent chert fragments. The Ap or A horizon has hue of 10YR or 7.5YR and chroma of 2 to 4. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Gasconade Series

The Gasconade series consists of shallow, somewhat excessively drained, moderately slowly permeable soils on uplands. These soils formed in material weathered from limestone. Slopes range from 14 to 50 percent.

Typical pedon of Gasconade cherty silty clay loam, in an area of Gasconade-Rock outcrop complex, 14 to 50 percent slopes, 790 feet north and 1,585 feet east of the southwest corner of sec. 35, T. 28 N., R. 2 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) cherty silty clay loam, dark reddish brown (5YR 3/3) dry; strong very fine granular structure; firm; many fine roots; about 30 percent chert fragments; neutral; clear smooth boundary.

Bw1—6 to 11 inches; dark brown (7.5YR 3/2) very cherty silty clay; strong fine and medium subangular blocky structure; firm; many fine and few medium roots; about 60 percent chert fragments; neutral; clear irregular boundary.

Bw2—11 to 14 inches; brown (7.5YR 4/4) cherty clay loam; strong fine subangular blocky structure; firm; common fine roots; about 20 percent chert fragments; mildly alkaline; clear irregular boundary.

R—14 inches; hard limestone bedrock.

The depth to bedrock ranges from 4 to 20 inches. The A horizon contains 15 to 35 percent chert fragments, and the Bw horizon contains 15 to 60 percent.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly cherty silty clay loam, but the range includes flaggy silty clay loam. The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is the cherty or very cherty analogs of clay loam, silty clay, silty clay loam, or clay.

Gladden Series

The Gladden series consists of deep, well drained soils on flood plains. These soils formed in loamy alluvium. Permeability is moderate in the upper part of the profile and moderately rapid to rapid in the lower part. Slopes range from 0 to 3 percent.

Typical pedon of Gladden sandy loam, sandy substratum, 0 to 3 percent slopes, 2,800 feet east and 3,100 feet south of the northwest corner of sec. 12, T. 26 N., R. 1 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; many fine roots; common worm channels and casts; few fine pebbles; slightly acid; clear smooth boundary.

Bw1—6 to 19 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; friable; many fine roots; common worm channels and casts; about 5 percent fine gravel; very strongly acid; clear smooth boundary.

Bw2—19 to 28 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; common fine roots; many small worm channels; about 5 percent fine gravel; very strongly acid; clear smooth boundary.

Bw3—28 to 33 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; few worm channels and casts; few fine soft iron and manganese masses; strongly acid; clear smooth boundary.

2C1—33 to 40 inches; yellowish brown (10YR 5/4) loamy sand; massive, very friable; few fine soft iron and manganese masses; strongly acid; clear smooth boundary.

2C2—40 to 60 inches; dark yellowish brown (10YR 4/4) very cherty sand; massive; loose; about 40 percent chert fragments; strongly acid.

The content of chert in the solum ranges from 0 to 5 percent. The A horizon has value of 3 to 5 and chroma of 2 or 3. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 5. It is fine sandy loam or sandy loam. The 2C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 5. It is sand, loamy sand, or the very cherty analogs of those textures. The content of chert in this horizon ranges from 35 to 60 percent.

Irondale Series

The Irondale series consists of moderately deep, well drained, moderately permeable soils on upland side slopes of mountains and peaks. These soils formed in a thin layer of loess and in silty material weathered from rhyolite and felsitic rocks. Slopes range from 14 to 40 percent.

Typical pedon of Irondale very cobbly silt loam, 14 to 40 percent slopes, extremely stony, 2,200 feet east and 3,000 feet south of the northwest corner of sec. 30, T. 28 N., R. 2 W.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) very cobbly silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine roots; about 45 percent coarse fragments, 20 percent less than 0.5 inch in size; stones cover about 5 percent of the surface; very strongly acid; abrupt smooth boundary.

E—2 to 7 inches; brown (10YR 5/3) very cobbly silt loam; weak very fine and fine subangular blocky structure; very friable; many fine and medium roots; few worm channels and casts; about 50 percent coarse fragments; very strongly acid; clear smooth boundary.

Bt1—7 to 16 inches; yellowish brown (10YR 5/4) very cobbly silt loam; weak fine subangular blocky structure; friable, few faint clay films on faces of peds; common medium and few fine roots; about 50 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt2—16 to 22 inches; brown (7.5YR 5/4) very cobbly silt loam; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; common medium roots; about 60 percent coarse fragments; very strongly acid; gradual wavy boundary.

BC—22 to 35 inches; strong brown (7.5YR 5/6) extremely cobbly silt loam; weak fine subangular blocky structure; friable; few large roots between angular cleavage planes; many fine roots between horizontal cleavage planes; few fine concretions of iron and manganese oxide; about 80 percent coarse fragments; very strongly acid; abrupt wavy boundary.

R—35 inches; brownish purple, hard rhyolite bedrock.

The depth to hard bedrock ranges from 20 to 40 inches. Boulders and angular stones cover 3 to 15 percent of the surface and are throughout the solum. The content of coarse fragments ranges from 35 to 60 percent in the A and Bt horizons and is as much as 85 percent in the BC horizon.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. The E horizon has hue of 10YR or 7.5YR and value of 4 to 6. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is the very cobbly analogs of silt loam, silty clay loam, or clay loam. The BC horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 5 to 8. It is the very cobbly, extremely cobbly, extremely gravelly, or very gravelly analogs of silt loam, loam, or clay loam.

Midco Series

The Midco series consists of deep, somewhat excessively drained soils on narrow flood plains. These soils formed in cherty alluvium. Permeability is moderately rapid. Slopes range from 1 to 4 percent.

Typical pedon of Midco very cherty loam, 1 to 4 percent slopes, 3,170 feet south and 1,050 feet east of the northwest corner of sec. 12, T. 27 N., R. 2 E.

A—0 to 7 inches; dark brown (10YR 3/3) very cherty loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; about 40 percent chert fragments; slightly acid; abrupt smooth boundary.

C1—7 to 20 inches; strong brown (7.5YR 5/6) very cherty sandy loam; massive; friable; common fine roots; about 55 percent chert fragments; medium acid; abrupt smooth boundary.

C2—20 to 33 inches; strong brown (7.5YR 5/6) extremely cherty sandy loam; massive; friable; about 80 percent chert fragments; medium acid; abrupt smooth boundary.

C3—33 to 48 inches; strong brown (7.5YR 5/6) very cherty sandy loam; massive; friable, about 50 percent chert fragments; medium acid; abrupt smooth boundary.

C4—48 to 60 inches; strong brown (7.5YR 5/6) extremely cherty sandy loam; massive, friable; about 65 percent chert fragments; medium acid.

The content of chert ranges from 20 to 80 percent throughout the profile. The A horizon has value of 3 or 4 and chroma of 2 to 4. It typically is very cherty loam, but the range includes cherty silt loam. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is very cherty or extremely cherty sandy loam.

Poynor Series

The Poynor series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in cherty sediments and cherty limestone residuum (fig. 14). Slopes range from 3 to 40 percent.

Typical pedon of Poynor very cherty silt loam, 14 to 40 percent slopes, 1,185 feet south and 1,000 feet east of the northwest corner of sec. 13, T. 27 N., R. 1 W.

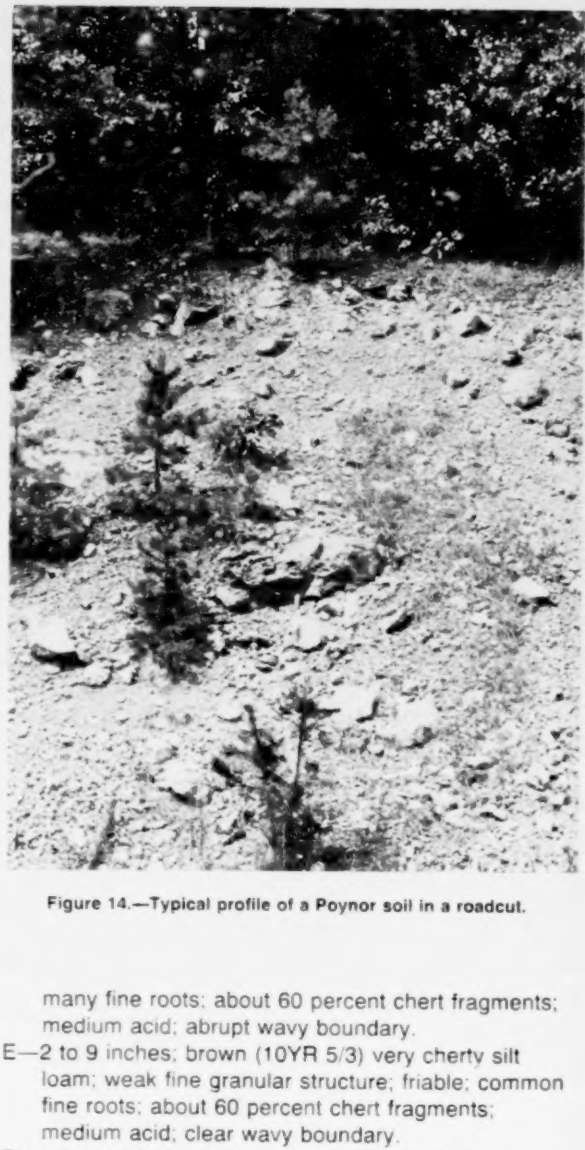


Figure 14.—Typical profile of a Poynor soil in a roadcut.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) very cherty silt loam, grayish brown (10YR 5/2) dry; weak fine and very fine granular structure; friable; many fine roots; about 60 percent chert fragments; medium acid; abrupt wavy boundary.

E—2 to 9 inches; brown (10YR 5/3) very cherty silt loam; weak fine granular structure; friable; common fine roots; about 60 percent chert fragments; medium acid; clear wavy boundary.

Bt1—9 to 17 inches; strong brown (7.5YR 5/6) very cherty silty clay loam; weak fine subangular structure; firm; few faint clay films on faces of peds; few fine roots; about 60 percent chert fragments; strongly acid; clear smooth boundary.

Bt2—17 to 32 inches; yellowish red (5YR 5/6) extremely cherty silty clay loam; moderate fine subangular blocky structure; common distinct clay films on faces of peds; firm; few fine roots; about 80 percent chert fragments; extremely acid; abrupt smooth boundary.

2Bt3—32 to 60 inches; red (2.5YR 4/6) clay; strong fine blocky structure; firm; common distinct clay films on faces of peds; about 5 percent chert fragments; very strongly acid.

The content of chert fragments larger than 3 inches ranges from 5 to 20 percent in the upper part of the profile and from 0 to 10 percent in the lower part. The A horizon has value of 2 to 6 and chroma of 1 to 4. It is dominantly very cherty silt loam, but very cherty loam, cherty silt loam, and cherty loam are within the range. The E horizon has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is the very cherty or extremely cherty analogs of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8.

Secesh Series

The Secesh series consists of deep, well drained, moderately permeable soils on high flood plains and low stream terraces. These soils formed in silty and loamy alluvium. Slopes range from 1 to 4 percent.

Typical pedon of Secesh silt loam, 1 to 4 percent slopes, 2,500 feet south and 500 feet east of the northwest corner of sec. 28, T. 27 N., R. 3 E.

A—0 to 10 inches; dark brown (10YR 3/3) silt loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; friable; many fine and common medium roots; common fine pores; few worm channels and casts; about 5 percent chert fragments; medium acid; clear smooth boundary.

Bt1—10 to 29 inches; strong brown (7.5YR 4/6) silty clay loam; moderate fine subangular blocky structure; firm; common fine and medium roots; many fine pores; about 5 percent chert fragments; strongly acid; clear wavy boundary.

2Bt2—29 to 60 inches; strong brown (7.5YR 5/6) extremely cherty sandy clay loam; weak fine subangular structure; firm; about 75 percent chert fragments, 30 percent of which are larger than 3 inches; strongly acid.

The A or Ap horizon contains 0 to 15 percent chert fragments less than 3 inches in size. It has value of 2 to 4 and chroma of 2 or 3. It is dominantly silt loam, but loam and sandy loam are within the range. The Bt and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They are silty clay loam, sandy clay loam, sandy loam, or the cherty to extremely cherty analogs of those textures. The content of chert is about 5 percent in the Bt horizon and ranges from 10 to 80 percent in the 2Bt horizon.

Wideman Series

The Wideman series consists of deep, excessively drained soils on flood plains and natural levees along the Current River. These soils formed in recently deposited alluvium. Permeability is moderately rapid. Slopes range from 1 to 4 percent.

Typical pedon of Wideman fine sandy loam, 1 to 4 percent slopes, 1,900 feet south and 200 feet west of the northeast corner of sec. 33, T. 28 N., R. 1 W.

A—0 to 9 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; common worm channels and casts; medium acid; abrupt smooth boundary.

C1—9 to 14 inches; dark brown (10YR 4/3) fine sand; single grain; loose; few small roots; neutral; clear smooth boundary.

C2—14 to 25 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; few small roots; few iron and manganese masses; medium acid; clear smooth boundary.

C3—25 to 30 inches; dark yellowish brown (10YR 4/4) loamy fine sand; single grain; loose; common fine roots; few worm channels; slightly acid; abrupt smooth boundary.

Ab—30 to 46 inches; very dark grayish brown (10YR 3/2) fine sandy loam; massive; friable; few fine roots; common worm channels; few soft iron and manganese masses; medium acid; clear smooth boundary.

C′—46 to 60 inches; yellowish brown (10YR 5/4) sand; single grain; loose; common soft iron and manganese masses; slightly acid.

The A horizon has value of 3 to 5 and chroma of 2 to 4. The C horizon has value of 4 to 6 and chroma of 2 to 4. Some pedons do not have an Ab horizon.

Wilderness Series

The Wilderness series consists of deep, moderately well drained soils on uplands. These soils formed in cherty limestone residuum. They have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. Slopes range from 3 to 14 percent.

Typical pedon of Wilderness very cherty silt loam, 3 to 9 percent slopes, 2,640 feet west and 450 feet south of the northeast corner of sec. 17, T. 26 N., R. 3 E.

A—0 to 5 inches; dark brown (10YR 4/3) very cherty silt loam, very pale brown (10YR 7/3) dry; weak fine granular structure; very friable; many fine roots; many fine pores; few worm channels and casts; common fine concretions of iron and manganese oxide; about 40 percent chert fragments; medium acid; abrupt smooth boundary.

Bt1—5 to 12 inches; brown (7.5YR 5/4) very cherty silt loam; weak fine subangular blocky structure; friable; many fine and few medium roots; few fine pores; few faint clay films on faces of peds and chert fragments; few concretions of iron and manganese oxide; about 50 percent chert fragments; medium acid; clear smooth boundary.

Bt2—12 to 18 inches; brown (7.5YR 5/4) extremely cherty silty clay loam; weak fine subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds and chert fragments; few fine concretions of iron and manganese oxide; about 70 percent chert fragments; strongly acid; abrupt smooth boundary.

Ex—18 to 24 inches; very pale brown (10YR 7/3) extremely cherty silt loam; weak fine granular and fine subangular blocky structure; slightly brittle; few fine roots; about 85 percent chert fragments; very strongly acid; clear smooth boundary.

Btx1—24 to 37 inches; strong brown (7.5YR 5/6) extremely cherty silty clay loam; many medium distinct pale brown (10YR 6/3) mottles; firm; brittle; few fine roots in seams; common prominent clay films on faces of peds in contact with seams of polygonal structure; many concretions of iron and manganese oxide; about 85 percent chert fragments; extremely acid; abrupt smooth boundary.

2Btx2—37 to 60 inches; variegated strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) very cobbly sandy loam; weak medium subangular blocky structure; firm; brittle; lenses of clay loam in fractures of sandstone; common concretions of iron and manganese oxide in large pockets; about 35 percent sandstone fragments; very strongly acid.

Depth to the fragipan ranges from 18 to 24 inches. The content of coarse fragments larger than 3 inches ranges from 0 to 15 percent above the fragipan and from 10 to 40 percent in and below the fragipan. The content of chert ranges from 35 to 80 percent above the fragipan and from 40 to 85 percent in and below the fragipan.

The A horizon has value of 3 to 5 and chroma of 2 or 3. Some pedons have an E horizon, which has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 6. It is the very cherty or extremely cherty analogs of silty clay loam or silt loam. The Ex and Btx horizons vary in color. They are the very cherty or extremely cherty analogs of silt loam or silty clay loam. The 2Btx horizon varies in texture. It is sandy loam in some pedons that have as much as 60 percent sandstone fragments.

Formation of the Soils

Soil forms through processes that act on accumulated or deposited geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. Relief conditions the effects of climate and plant and animal life. The parent material affects the kind of soil profile that forms and in extreme cases determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil that has distinct horizons. Some time is always required for differentiation of soil horizons. Generally, a long time is required for the formation of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It determines the limits of the mineral composition of the soil. The soils in Carter County formed mainly in residual material and in loess or alluvium. In some areas they formed in a combination of these materials.

Loess is wind-deposited material (predominantly silt sized), probably blown in from the larger flood plains. Its thickness ranges from about 2 feet on the remnants of the Salem Plateau to only a few inches in the more deeply dissected hilly areas. In places on the basal slopes or benches in the narrow valleys, the loess is thicker. In Carter County, only Captina soils have significant amounts of loess in the parent material. The upper part of these soils formed in loess.

Before the main loess deposition, nearly all of the uplands apparently had a thick cherty surface layer underlain by clayey residuum. This surface layer consisted of cherty sediments. Three typical examples of the residuum are as follows: that which developed in Potosi dolomite, consisting of red clay or cherty red clays; that which developed in the Roubidoux Formation, a cherty mass several feet deep; and that which developed in rhyolite and felsitic rocks. In Carter County, the residuum developed over a period of more than 600 million years. Poynor soils formed in a thin layer of cherty sediments over red clay. Clarksville and Wilderness soils formed in thicker layers of cherty material over red clay. Only Irondale soils formed in the rhyolite or felsitic residuum, which originated from the Ozark uplift.

The youngest soils in the county formed in alluvial deposits on flood plains along streams. These deposits range from silt or sand to gravel-sized fragments. Because of the slope and rapid runoff, the soils on the narrow flood plains commonly have large amounts of gravel. Midco soils formed in gravelly alluvium. Elk soils formed in silty alluvium. Wideman soils formed in sandy alluvium, and Secesh soils formed in mixed silty and gravelly alluvium.

Climate

Climate has been an important factor in the formation of the soils in Carter County. Although extreme climatic changes occur very slowly, they have had a tremendous impact on conditions in the area. The types of vegetation in the area changed with variations in climate. Eventually, the climate favored forest vegetation, which had a major effect on the soils. This type of vegetation has resulted in soils that are highly leached and low in organic matter content and that have a light colored surface layer. Loess was probably deposited by prevailing strong winds during cold, arid periods. Thus, climate affected the size and amount of soil particles and the distance they were transported. Today, microclimates created by different slope aspects affect soil formation through their effect on plant species and on soil moisture and temperature.

Plants and Animals

Plants, burrowing animals, insects, bacteria, and fungi affect soil formation. They affect the organic matter content, plant nutrients, soil structure and porosity, and, indirectly, the dominant plant species.

Most of the soils of Carter County formed under a cover of trees and shrubs. Tree roots and leaves do not break down into organic matter so easily as prairie grasses. As a result, the surface layer and subsurface layer of soils that formed primarily in residual material under forest vegetation are light colored. Clarksville, Poynor, and Wilderness soils are examples.

Relief

Relief influences soil formation primarily through its effect on drainage, runoff, and erosion. To some extent, the exposure of the soil to sunlight and wind is also affected by relief.

The slope and permeability of the soil and the amount and intensity of rainfall determine the amount of water entering and passing through the soil. In steep areas, runoff is rapid and very little water passes through the soil. Consequently, the soils in these areas do not have distinct horizons. In gently sloping or nearly level areas, runoff is slow and most of the water passes through the soil. As a result, the soils in these areas show maximum profile development. Rapidly permeable soils form more slowly than slowly permeable soils on similar slopes.

In general, soils on the steeper south-facing slopes are droughtier than those that formed in similar material on north-facing slopes. The soils on the south-facing slopes receive more direct sunlight. The droughtiness influences soil formation through its effect on erosion, freezing and thawing, and the kind and amount of vegetation.

Time

The youngest soils in Carter County formed in alluvium. They show little or no evidence of profile development because frequent flooding continually adds alluvial material to the surface. Wideman and Midco soils are examples. The oldest alluvial soils are Elk and Secesh soils, which are on the highest flood plains. The profiles of these soils indicate a higher degree of development than those of the younger alluvial soils.

The greatest degree of profile development in the county is evident in Clarksville, Captina, Wilderness, and Poynor soils, which formed in residuum and other sediments that are very old. The leaching of bases from the upper to lower horizons in these soils indicates an advanced degree of maturity.

Because of the extreme age of the parent material of the upland soils in Carter County, it is difficult to distinguish any observable difference in the age of the soils based on the degree of profile development.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vols., illus.

(2) American Society for Testing and Materials. 1985. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Missouri Crop and Livestock Reporting Service. Carter County agri-facts. 1985. 4 pp., illus.

(4) Oakley, Gene. 1970. The history of Carter County. 142 pp., illus.

(5) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

(6) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(7) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(8) United States Department of Agriculture, Soil Conservation Service. National resources inventory. (Available in the State Office of the Soil Conservation Service at Columbia, Missouri)

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Ash-flow tuff. A tuff deposited by an ash flow or gaseous cloud, a type of ignimbrite. It is a consolidated but not necessarily welded deposit.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious.

Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and the wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand.

A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25

Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-86 at Clearwater Dam, Missouri)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Averag snowfa
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	43.4	20.6	32.0	70	8	19	2.65	0.93	4.07	5	2.3
February----	48.8	24.3	36.6	76	8	18	2.79	1.54	3.88	6	2.5
March-------	58.6	33.0	45.8	85	11	95	4.50	2.30	6.40	8	1.1
April-------	71.7	44.3	58.0	91	24	265	4.31	2.08	6.23	7	.0
May---------	79.4	52.5	66.0	93	34	496	4.77	2.84	6.49	7	.0
June--------	86.8	60.9	73.9	98	45	717	3.27	1.44	4.83	6	.0
July--------	91.7	65.4	78.6	102	52	887	3.59	1.64	5.26	6	.0
August------	89.6	63.4	76.5	102	50	822	3.59	1.62	5.27	5	.0
September---	82.7	56.3	69.5	97	38	585	3.22	1.17	4.91	5	.0
October-----	71.9	44.1	58.0	90	25	264	2.88	.78	4.58	5	.0
November----	58.1	33.7	45.9	79	12	46	4.06	1.79	5.99	6	.2
December----	47.0	25.2	36.1	71	0	20	3.72	1.40	5.65	6	1.1
Yearly:											
Average----	69.1	43.6	56.4	---	---	---	---	---	---	---	---
Extreme----	---	---	---	103	0	---	---	---	---	---	---
Total------	---	---	---	---	---	4,234	43.35	35.24	51.63	72	7.2

* Growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-86 at Clearwater Dam, Missouri)

Probability	Temperature		
	24°F or lower	28° F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 7	Apr. 17	May 3
2 years in 10 later than--	Apr. 2	Apr. 12	Apr. 27
5 years in 10 later than--	Mar. 25	Apr. 4	Apr. 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 27	Oct. 20	Oct. 5
2 years in 10 earlier than--	Nov. 1	Oct. 24	Oct. 10
5 years in 10 earlier than--	Nov. 10	Nov. 1	Oct. 19

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-86 at Clearwater Dam, Missouri)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	210	192	162
8 years in 10	217	198	170
5 years in 10	230	210	184
2 years in 10	242	222	198
1 year in 10	249	228	205

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
14B	Elk silt loam, 1 to 4 percent slopes		
15A	Gladden sandy loam, sandy substratum, 0 to 3 percent slopes	2,250	1.0
18A	Auxvasse silt loam, 0 to 3 percent slopes	450	0.2
19B	Midco very cherty loam, 1 to 4 percent slopes	530	0.2
24B	Secesh silt loam, 1 to 4 percent slopes	15,730	7.0
26B	Wideman fine sandy loam, 1 to 4 percent slopes	1,180	0.5
38B	Captina silt loam, 2 to 5 percent slopes	1,700	0.8
38C	Captina silt loam, 5 to 9 percent slopes	3,250	1.5
42C	Clarksville very cherty silt loam, 3 to 9 percent slopes	19,500	8.7
42D	Clarksville very cherty silt loam, 9 to 14 percent slopes	20,450	9.1
42F	Clarksville very cherty silt loam, 14 to 40 percent slopes	19,250	8.6
62F	Irondale very cobbly silt loam, 14 to 40 percent slopes, extremely stony	55,200	24.7
70F	Gasconade-Rock outcrop complex, 14 to 50 percent slopes	1,650	0.7
76C	Poynor very cherty silt loam, 3 to 9 percent slopes	1,700	0.8
76D	Poynor very cherty silt loam, 9 to 14 percent slopes	5,450	2.4
76F	Poynor very cherty silt loam, 14 to 40 percent slopes	5,230	2.3
80C	Wilderness very cherty silt loam, 3 to 9 percent slopes	55,150	24.7
81D	Wilderness-Clarksville complex, 9 to 14 percent slopes	10,915	4.9
	Water areas less than 40 acres in size	3,580	1.6
		597	0.3
	Total	223,762	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
14B	Elk silt loam, 1 to 4 percent slopes
15A	Gladden sandy loam, sandy substratum, 0 to 3 percent slopes
18A	Auxvasse silt loam, 0 to 3 percent slopes (where drained)
24B	Secesh silt loam, 1 to 4 percent slopes
38B	Captina silt loam, 2 to 5 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Soybeans	Grain sorghum	Winter wheat	Tall fescue hay	Tall fescue-red clover hay	Tall fescue	Switchgrass
		Bu	Bu	Bu	Tons	Tons	AUM*	AUM*
14B-------------- Elk	IIe	32	65	40	3.7	3.0	6.5	6.5
15A-------------- Gladden	IIw	---	---	25	2.0	2.5	5.0	5.5
18A-------------- Auxvasse	IIIw	27	62	---	2.0	2.1	6.5	6.5
19B-------------- Midco	IIIw	---	---	20	2.0	2.5	5.0	5.0
24B-------------- Secesh	IIw	30	60	35	2.5	3.0	6.2	6.5
26B-------------- Wideman	Vw	---	---	---	1.5	2.0	3.0	---
38B-------------- Captina	IIe	30	65	33	2.5	3.0	6.0	6.0
38C-------------- Captina	IIIe	25	55	30	2.3	2.5	5.0	5.0
42C-------------- Clarksville	IVs	---	---	16	1.5	2.1	3.5	4.0
42D-------------- Clarksville	VIe	---	---	---	---	---	3.0	---
42F-------------- Clarksville	VIIe	---	---	---	---	---	2.0	---
62F-------------- Irondale	VIIs	---	---	---	---	---	2.0	---
70F**------------ Gasconade-Rock outcrop	VIIs	---	---	---	---	---	2.0	---
76C-------------- Poynor	IVs	---	---	---	---	---	3.5	---
76D-------------- Poynor	VIe	---	---	---	---	---	2.8	---
76F-------------- Poynor	VIIe	---	---	---	---	---	2.0	---
80C-------------- Wilderness	IVs	---	---	---	1.5	1.5	3.0	4.0
81D-------------- Wilderness-Clarksville	VIe	---	---	---	---	---	2.0	---

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* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
14B Elk	5A	Slight	Slight	Slight	Slight	Cherrybark oak	95	77	Black walnut, white oak, northern red oak, cherrybark oak, shortleaf pine.
						Yellow poplar	91	---	
						Pin oak	96	78	
						Hackberry	---	---	
						Red maple	---	---	
						American sycamore	---	---	
						Black walnut	---	---	
15A Gladden	4A	Slight	Slight	Slight	Slight	White oak	75	55	Black walnut, white oak.
						American sycamore	85	---	
						Black walnut	---	---	
						Shortleaf pine	---	---	
18A Auxvasse	4W	Slight	Severe	Moderate	Moderate	Pin oak	76	58	Pin oak, green ash, eastern cottonwood, silver maple.
						Northern red oak	---	---	
						Silver maple	---	---	
						Green ash	---	---	
19B Midco	3F	Slight	Moderate	Moderate	Slight	White oak	55	38	White oak, shortleaf pine.
						American sycamore	---	---	
						Shortleaf pine	---	---	
						Black oak	60	43	
24B Secesh	3A	Slight	Slight	Slight	Slight	White oak	60	43	Black walnut, shortleaf pine, American sycamore.
						Shortleaf pine	---	---	
						American sycamore	---	---	
						Black walnut	---	---	
						Black oak	---	---	
26B Wideman	7S	Slight	Moderate	Moderate	Slight	Eastern cottonwood	90	103	Eastern cottonwood, American sycamore, shortleaf pine.
						American sycamore	80	---	
38B, 38C Captina	3D	Slight	Slight	Slight	Moderate	Northern red oak	65	43	Shortleaf pine, northern red oak, white oak.
						White oak	60	43	
						Black oak	65	43	
						Eastern red cedar	40	---	
						Post oak	---	---	
42C, 42D Clarksville	3F	Slight	Slight	Moderate	Slight	White oak	58	41	White oak, shortleaf pine.
						Shortleaf pine	61	---	
						Black oak	61	44	
						Northern red oak	61	44	
						Scarlet oak	---	---	
42F Clarksville	3R	Moderate	Moderate	Moderate	Slight	White oak	58	41	White oak, shortleaf pine.
						Shortleaf pine	61	---	
						Black oak	61	44	
						Northern red oak	61	44	
						Scarlet oak	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
62F------------- Irondale	2R	Moderate	Moderate	Moderate	Slight	White oak-----------	45	30	Shortleaf pine.
						Black oak-----------	48	33	
						Northern red oak----	45	30	
						Shortleaf pine------	---	---	
						Scarlet oak---------	---	---	
70F**:									
Gasconade------	2R	Severe	Severe	Moderate	Severe	Chinkapin oak-------	40	2	Eastern redcedar, shortleaf pine.
						Eastern redcedar----	30	2	
						Post oak------------	---	---	
						Blackjack oak-------	---	---	
Rock outcrop.									
76C, 76D-------- Poynor	3A	Slight	Slight	Slight	Slight	White oak-----------	58	41	Black oak, shortleaf pine.
						Shortleaf pine------	---	---	
76F------------- Poynor	3R	Moderate	Moderate	Moderate	Slight	White oak-----------	58	41	Black oak, shortleaf pine.
						Shortleaf pine------	---	---	
80C------------- Wilderness	3D	Slight	Slight	Moderate	Moderate	White oak-----------	55	38	White oak, shortleaf pine, black oak.
						Black oak-----------	---	---	
81D**:									
Wilderness-----	3D	Slight	Slight	Moderate	Moderate	White oak-----------	55	38	White oak, shortleaf pine, black oak.
						Black oak-----------	---	---	
Clarksville----	3F	Slight	Slight	Moderate	Slight	White oak-----------	58	41	White oak, shortleaf pine.
						Shortleaf pine------	61	---	
						Black oak-----------	61	44	
						Northern red oak----	61	44	
						Scarlet oak---------	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
14B Elk	---	Amur honeysuckle, Amur maple, autumn olive, possumhaw.	Eastern redcedar, black walnut, Virginia pine.	Green ash, shortleaf pine, cherrybark oak, loblolly pine.	Yellow poplar.
15A Gladden	---	Autumn olive, Amur honeysuckle, Amur maple, lilac.	Eastern redcedar	Austrian pine, honeylocust, pin oak, eastern white pine, hackberry, green ash.	Eastern cottonwood.
18A Auxvasse	---	Amur honeysuckle, lilac, Amur maple, autumn olive.	Eastern redcedar	Austrian pine, hackberry, green ash, pin oak, honeylocust, eastern white pine.	Eastern cottonwood.
19B Midco	---	Autumn olive, Amur honeysuckle, Amur maple, lilac.	Eastern redcedar	Austrian pine, honeylocust, pin oak, eastern white pine, hackberry, green ash.	Eastern cottonwood.
24B Secesh	---	Autumn olive, Amur honeysuckle, Amur maple, lilac.	Eastern redcedar	Austrian pine, honeylocust, pin oak, eastern white pine, hackberry, green ash.	Eastern cottonwood.
26B Wideman	---	Amur honeysuckle, Amur maple, autumn olive, possumhaw.	Virginia pine, eastern redcedar.	Pecan, green ash, cherrybark oak, sweetgum, loblolly pine, baldcypress.	---
38B, 38C Captina	Lilac	Amur honeysuckle, Amur maple, autumn olive, Manchurian crabapple.	Eastern redcedar, Russian olive, hackberry, green ash, Austrian pine, jack pine.	Honeylocust	---
42C, 42D, 42F Clarksville	Amur honeysuckle, lilac, fragrant sumac.	Autumn olive	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian olive.	Siberian elm	---
62F Irondale	Amur honeysuckle, lilac, fragrant sumac.	Autumn olive	Austrian pine, honeylocust, eastern redcedar, green ash, bur oak, Russian olive, hackberry.	Siberian elm	---

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
70F*:					
Gasconade.					
Rock outcrop.					
76C, 76D, 76F Poynor	Siberian peashrub	Amur honeysuckle, eastern redcedar, autumn olive, radiant crabapple, Washington hawthorn, lilac.	Eastern white pine, jack pine, Austrian pine, red pine.	---	---
80C Wilderness	Amur honeysuckle, lilac, fragrant sumac.	Autumn olive	Honeylocust, Austrian pine, hackberry, eastern redcedar, green ash, bur oak, Russian olive.	Siberian elm	---
81D*:					
Wilderness	Amur honeysuckle, lilac, fragrant sumac.	Autumn olive	Honeylocust, Austrian pine, hackberry, eastern redcedar, green ash, bur oak, Russian olive.	Siberian elm	---
Clarksville	Amur honeysuckle, lilac, fragrant sumac.	Autumn olive	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian olive.	Siberian elm	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
14B Elk	Severe: flooding.	Slight	Moderate: slope, flooding.	Severe: erodes easily.	Moderate: flooding.
15A Gladden	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding.
18A Auxvasse	Severe: flooding, wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
19B Midco	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones, flooding.	Severe: small stones.	Severe: small stones.
24B Secesh	Severe: flooding.	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones, flooding.
26B Wideman	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
38B Captina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
38C Captina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Slight	Slight.
42C, 42D Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
42F Clarksville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
62F Irondale	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.
70F*:					
Gasconade	Severe: slope, thin layer.	Severe: slope, thin layer.	Severe: slope, large stones, thin layer.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
76C, 76D Poynor	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
76F Poynor	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope, droughty.
80C Wilderness	Severe: wetness.	Moderate: wetness, small stones.	Severe: slope, small stones, wetness.	Moderate: wetness.	Severe: droughty.
81D*:					
Wilderness	Severe: wetness.	Moderate: slope, wetness, small stones.	Severe: slope, small stones, wetness.	Moderate: wetness.	Severe: droughty.
Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
14B----------------- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
15A----------------- Gladden	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18A----------------- Auxvasse	Fair	Good	Poor	Good	Good	Good	Fair	Fair	Good	Fair.
19B----------------- Midco	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
24B----------------- Secesh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
26B----------------- Wideman	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
38B----------------- Captina	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
38C----------------- Captina	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
42C, 42D----------- Clarksville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
42F----------------- Clarksville	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
62F----------------- Irondale	Very poor.	Poor	Very [illegible]	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
70F*:										
Gasconade----------	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
76C, 76D----------- Poynor	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
76F----------------- Poynor	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
80C----------------- Wilderness	Poor	Poor	Very poor.	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
81D*:										
Wilderness---------	Poor	Poor	Very poor.	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Clarksville--------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
14B Elk	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
15A Gladden	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
18A Auxvasse	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
19B Midco	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones.
24B Secesh	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: large stones, flooding.
26B Wideman	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
38B Captina	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.
38C Captina	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
42C Clarksville	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Severe: small stones.
42D Clarksville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
42F Clarksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
62F Irondale	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
70F*:						
Gasconade	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
76C Poynor	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Severe: small stones, droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
76D----------------- Poynor	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Severe: small stones, droughty.
76F----------------- Poynor	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: small stones, slope, droughty.
80C----------------- Wilderness	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Severe: droughty.
81D*:						
Wilderness---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Moderate: wetness, slope, frost action.	Severe: droughty.
Clarksville-------	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
14B----------------- Elk	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey, thin layer.
15A----------------- Gladden	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: thin layer.
18A----------------- Auxvasse	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
19B----------------- Midco	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
24B----------------- Secesh	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones.
26B----------------- Wideman	Severe: flooding.	Severe: flooding, seepage.	Severe: seepage, flooding, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
38B----------------- Captina	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: small stones.
38C----------------- Captina	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: small stones.
42C----------------- Clarksville	Slight-----------	Severe: seepage.	Moderate: too clayey.	Severe: seepage.	Poor: small stones.
42D----------------- Clarksville	Moderate: slope.	Severe: seepage, slope.	Moderate: slope, too clayey.	Severe: seepage.	Poor: small stones.
42F----------------- Clarksville	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
62F----------------- Irondale	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
70F*: Gasconade----------	Severe: thin layer, seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, too clayey, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70F*: Rock outcrop.					
76C Poynor	Slight	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
76D Poynor	Moderate: slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
76F Poynor	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
80C Wilderness	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, small stones.
81D*: Wilderness	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, small stones.
Clarksville	Moderate: slope.	Severe: seepage, slope.	Moderate: slope, too clayey.	Severe: seepage.	Poor: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14B Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
15A Gladden	Good	Probable	Probable	Poor: small stones, area reclaim.
18A Auxvasse	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
19B Midco	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
24B Secesh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
26B Wideman	Good	Improbable: thin layer.	Improbable: too sandy.	Good.
38B, 38C Captina	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
42C, 42D Clarksville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
42F Clarksville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
62F Irondale	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
70F*: Gasconade	Poor: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
Rock outcrop.				
76C, 76D Poynor	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
76F Poynor	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
80C------------------- Wilderness	Fair: large stones, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
81D*:				
Wilderness-----------	Fair: large stones, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Clarksville----------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
14B--------------- Elk	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
15A--------------- Gladden	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, flooding.	Soil blowing---	Favorable.
18A--------------- Auxvasse	Slight---------	Moderate: wetness.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
19B--------------- Midco	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.
24B--------------- Secesh	Severe: seepage.	Slight---------	Deep to water	Favorable------	Favorable------	Favorable.
26B--------------- Wideman	Severe: seepage.	Severe: piping, seepage.	Deep to water	Flooding, fast intake, droughty.	Too sandy------	Droughty.
38B--------------- Captina	Moderate: seepage.	Moderate: piping, wetness.	Percs slowly---	Wetness, percs slowly, rooting depth.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
38C--------------- Captina	Moderate: seepage.	Moderate: piping, wetness.	Percs slowly, slope.	Slope, wetness.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
42C--------------- Clarksville	Severe: seepage.	Moderate: large stones.	Deep to water	Droughty, slope.	Large stones---	Large stones, droughty.
42D, 42F---------- Clarksville	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
62F--------------- Irondale	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
70F*:						
Gasconade---------	Severe: depth to rock, seepage, slope.	Severe: thin layer, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
76C--------------- Poynor	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Droughty, slope.	Large stones---	Large stones, droughty.
76D, 76F---------- Poynor	Severe: slope.	Severe: hard to pack.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
80C--------------- Wilderness	Moderate: slope, seepage.	Moderate: large stones, wetness.	Large stones, slope, percs slowly.	Slope, large stones, wetness.	Large stones, wetness, rooting depth.	Large stones, wetness, rooting depth.
81D*:						
Wilderness--------	Severe: slope.	Moderate: large stones, wetness.	Large stones, slope, percs slowly.	Slope, large stones, wetness.	Slope, large stones, wetness.	Large stones, wetness, slope.
Clarksville-------	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
14B Elk	0-10	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	10-40	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	40-60	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML, SM-SC	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
15A Gladden	0-6	Sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2-4	0	80-100	75-100	55-95	30-65	<25	NP-5
	6-33	Sandy loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4, A-2-4	0	80-100	75-100	55-95	30-65	<25	NP-5
	33-40	Loamy sand, sand, cherty loamy sand.	SM, SP-SM, SM-SC	A-1-b, A-3, A-2-4	0-15	60-100	50-100	25-75	5-30	<15	NP-5
	40-60	Very cherty sand, very cherty loamy sand, extremely cherty sand.	SM, SP-SM, GM, GP-GM	A-1-a, A-1-b	0-20	15-75	10-70	5-50	0-20	<15	NP-5
18A Auxvasse	0-14	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-100	25-35	5-15
	14-45	Silty clay, clay	CH	A-7	0	100	100	95-100	90-100	50-65	30-40
	45-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	90-96	35-45	20-25
19B Midco	0-7	Very cherty loam	SM, SM-SC, GM, GM-GC	A-4, A-2-4, A-1-b	5-20	60-80	20-50	20-50	20-50	<25	2-7
	7-60	Gravelly loam, extremely cherty sandy loam, very cherty sandy loam.	SM, SM-SC, GM, GM-GC	A-2-4, A-1-b	5-25	35-70	20-65	20-60	20-35	<25	2-7
24B Secesh	0-10	Silt loam	ML	A-4	0-10	85-100	80-100	75-95	60-90	20-30	NP-7
	10-29	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-10	80-100	75-100	70-95	60-90	25-35	5-12
	29-60	Extremely cherty sandy clay loam, very cherty clay loam, extremely cherty clay loam.	GC, SC, GP-GC, SP-SC	A-6, A-2-6	15-45	40-70	25-65	20-45	10-40	30-40	11-20
26B Wideman	0-9	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	65-90	30-60	<20	NP-3
	9-30	Sandy loam, loamy fine sand, fine sand.	SP-SM, SM	A-2, A-3	0	100	100	60-100	10-35	---	NP
	30-46	Fine sandy loam, fine sand, silt loam.	SM, ML, CL-ML, SM-SC	A-2, A-4	0	100	100	65-100	30-75	<25	NP-5
	46-60	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2	0	90-100	70-100	50-75	10-35	---	NP

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
38B, 38C--------- Captina	0-5	Silt loam--------	ML	A-4	0	95-100	92-100	85-100	65-90	<30	4-10
	5-26	Silt loam, silty clay loam.	CL	A-4, A-6	0	95-100	92-100	85-100	65-95	20-40	10-20
	26-30	Silt loam, silty clay loam, cherty silt loam.	SC, CL	A-4, A-6	0-5	75-100	50-100	45-100	35-95	20-40	10-20
	30-60	Silt loam, silty clay loam, very cherty silty clay loam.	GC, SC, CL	A-2, A-4, A-6	0-15	50-100	25-100	20-100	20-95	20-40	10-20
42C, 42D, 42F---- Clarksville	0-8	Very cherty silt loam.	GC, SC, SM-SC, GP-GC	A-2-4, A-2-6, A-1-a	5-30	30-70	10-60	5-50	5-35	20-40	5-15
	8-49	Very cherty silty clay loam, extremely cherty silty clay loam.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	5-20	30-70	10-60	10-50	5-45	30-40	15-25
	49-60	Very cherty silty clay, cherty clay, extremely cherty silty clay.	GC, SC, GP-GC, SP-SC	A-7, A-2-7	5-20	30-70	20-60	10-50	10-45	55-75	35-55
62F-------------- Irondale	0-7	Very cobbly silt loam.	GM-GC, GC	A-4, A-2-4	10-25	40-65	40-60	35-55	30-50	20-33	4-10
	7-22	Very cobbly silt loam, very cobbly silty clay loam.	GM-GC, GC	A-4, A-6, A-2	25-40	30-55	30-50	30-50	25-45	25-40	5-18
	22-35	Extremely cobbly silt loam, very cobbly silty clay loam.	GM-GC, GC	A-4, A-6, A-2	25-40	30-55	30-50	30-50	25-45	20-40	4-18
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
70F*:											
Gasconade-------	0-6	Cherty silty clay loam.	CL	A-7-6	5-15	75-90	70-85	60-75	55-65	40-45	20-25
	6-14	Cherty clay loam, very cherty silty clay.	GC	A-2-7, A-7-6	15-40	40-60	30-50	30-50	25-40	40-45	20-25
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
76C, 76D, 76F---- Poynor	0-9	Very cherty silt loam.	GM, GM-GC, SM-SC, SM	A-1, A-4	5-20	35-70	15-65	10-60	10-45	20-30	2-8
	9-32	Very cherty silty clay loam, extremely cherty silty clay loam.	GC, SC	A-2-6, A-6	5-20	30-70	20-60	20-50	15-45	25-40	10-20
	32-60	Silty clay, clay	CH, MH	A-7	0-10	90-100	90-100	85-95	70-90	51-70	25-35

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
80C-------------- Wilderness	0-5	Very cherty silt loam.	SM-SC, SC, SP-SC, GC	A-1, A-4, A-2-4	0-10	60-85	50-75	20-50	10-40	20-30	5-10
	5-18	Very cherty silt loam, extremely cherty silty clay loam.	GC, GP-GC, SC, SP-SC	A-6, A-2-6	5-15	40-70	20-60	10-50	10-40	25-40	10-20
	18-60	Extremely cherty silt loam, extremely cherty silty clay loam, very cobbly sandy loam.	GM-GC, GC, GP-GC	A-1, A-2-4, A-2-6	10-40	30-60	10-45	10-40	5-35	20-40	5-15
81D*:											
Wilderness------	0-10	Cherty silt loam	SM-SC, SC, SP-SC, GC	A-1, A-4, A-2-4	0-10	60-85	50-75	20-50	10-40	20-30	5-10
	10-22	Very cherty silty clay loam, extremely cherty silty clay loam.	GC, GP-GC, SC, SP-SC	A-6, A-2-6	5-15	40-70	20-60	10-50	10-40	25-40	10-20
	22-43	Very cherty silt loam, extremely cherty silty clay loam.	GM-GC, GC, GP-GC	A-1, A-2-4, A-2-6	10-40	30-60	10-45	10-40	5-35	20-40	5-15
	43-60	Very cherty silty clay, very cherty clay, extremely cherty silty clay.	GC, GP-GC	A-2-6	10-40	30-60	10-45	10-40	5-35	25-40	15-25
Clarksville-----	0-9	Very cherty silt loam.	GC, SC, SM-SC, GP-GC	A-2-4, A-2-6, A-1-a	5-30	30-70	10-60	5-50	5-35	20-40	5-15
	9-33	Very cherty silty clay loam, extremely cherty silty clay loam.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	5-20	30-70	10-60	10-50	5-45	30-40	15-25
	33-60	Very cherty silty clay, very cherty clay, extremely cherty silty clay.	GC, SC, GP-GC, SP-SC	A-7, A-2-7	5-20	30-70	20-60	10-50	10-45	55-75	35-55

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
14B	0-10	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.37	5	.5-3
Elk	10-40	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.28		
	40-60	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low	0.28		
15A	0-6	10-20	1.25-1.45	0.6-2.0	0.13-0.18	4.5-6.5	Low	0.24	4	2-4
Gladden	6-33	10-18	1.25-1.45	0.6-2.0	0.13-0.18	4.5-6.0	Low	0.24		
	33-40	2-12	1.30-1.50	2.0-6.0	0.03-0.06	4.5-5.5	Low	0.17		
	40-60	2-12	1.20-1.50	2.0-20	0.01-0.03	4.5-5.5	Low	0.10		
18A	0-14	8-16	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	.5-1
Auxvasse	14-45	45-60	1.35-1.50	<0.06	0.09-0.11	4.5-7.8	High	0.43		
	45-60	25-40	1.35-1.50	0.2-0.6	0.18-0.20	4.5-7.8	Moderate	0.43		
19B	0-7	15-25	1.10-1.30	2.0-6.0	0.09-0.13	5.6-6.5	Low	0.24	5	.5-2
Midco	7-60	10-25	1.20-1.40	2.0-6.0	0.05-0.11	5.1-7.3	Low	0.24		
24B	0-10	15-25	1.10-1.30	0.6-2.0	0.16-0.20	5.1-6.5	Low	0.32	4	<2
Secesh	10-29	20-30	1.20-1.40	0.6-2.0	0.13-0.19	4.5-6.0	Low	0.32		
	29-60	25-35	1.30-1.50	2.0-6.0	0.03-0.08	4.5-6.0	Low	0.24		
26B	0-9	4-18	1.40-1.60	2.0-6.0	0.07-0.15	3.6-6.0	Low	0.17	5	.5-1
Wideman	9-30	2-15	1.40-1.60	>6.0	0.06-0.14	5.1-7.3	Low	0.17		
	30-46	5-18	1.30-1.50	2.0-6.0	0.06-0.20	5.1-7.3	Low	0.20		
	46-60	2-12	1.40-1.60	>6.0	0.05-0.11	5.1-7.3	Low	0.17		
38B, 38C	0-5	8-20	1.25-1.45	0.6-2.0	0.14-0.20	4.5-6.5	Low	0.43	3	.5-2
Captina	5-26	20-35	1.40-1.50	0.6-2.0	0.14-0.20	3.6-6.0	Low	0.43		
	26-30	20-40	1.45-1.60	0.06-0.2	0.08-0.12	3.6-6.0	Low	0.37		
	30-60	20-40	1.45-1.60	0.06-0.2	0.05-0.12	3.6-6.0	Low	0.32		
42C, 42D, 42F	0-8	14-20	1.20-1.40	2.0-6.0	0.07-0.12	3.6-6.0	Low	0.28	3	.5-2
Clarksville	8-49	25-35	1.30-1.45	2.0-6.0	0.06-0.10	3.6-5.5	Low	0.32		
	49-60	40-75	1.20-1.40	0.6-2.0	0.05-0.08	3.6-5.5	Moderate	0.20		
62F	0-7	7-20	1.00-1.30	0.6-2.0	0.06-0.14	4.5-6.0	Low	0.17	4	1-2
Irondale	7-22	15-30	1.10-1.40	0.6-2.0	0.08-0.13	3.6-5.5	Low	0.17		
	22-35	12-25	1.20-1.50	0.6-2.0	0.04-0.10	3.6-5.0	Low	0.17		
	35	---	---	---	---	---	-------------	----		
70F*:										
Gasconade	0-6	35-40	1.35-1.50	0.6-2.0	0.10-0.12	6.1-7.8	Moderate	0.20	2	2-4
	6-14	35-60	1.35-1.50	0.2-0.6	0.05-0.07	6.1-7.8	Moderate	0.20		
	14	---	---	---	---	---	-------------	----		
Rock outcrop.										
76C, 76D, 76F	0-9	10-22	1.20-1.45	2.0-6.0	0.04-0.12	3.6-6.5	Low	0.28	3	.5-1
Poynor	9-32	27-35	1.40-1.55	0.6-2.0	0.02-0.09	3.6-6.0	Low	0.28		
	32-60	42-70	1.50-1.65	0.6-2.0	0.08-0.12	3.6-5.0	Moderate	0.28		
80C	0-5	18-27	1.20-1.45	2.0-6.0	0.07-0.12	4.5-6.5	Low	0.28	2	.5-2
Wilderness	5-18	25-35	1.30-1.50	0.6-2.0	0.03-0.10	4.5-6.0	Low	0.28		
	18-60	20-35	1.70-2.00	0.06-0.2	0.01-0.05	3.6-5.5	Low	0 28		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
81D*:										
Wilderness------	0-10	18-27	1.20-1.45	2.0-6.0	0.07-0.12	4.5-6.5	Low-----------	0.28	2	.5-2
	10-22	25-35	1.30-1.50	0.6-2.0	0.03-0.10	4.5-6.0	Low-----------	0.28		
	22-43	20-35	1.70-2.00	0.06-0.2	0.01-0.05	3.6-5.5	Low-----------	0.28		
	43-60	40-70	1.50-1.70	0.6-2.0	0.02-0.06	4.5-6.0	Moderate-----	0.28		
Clarksville-----	0-9	14-20	1.20-1.40	2.0-6.0	0.07-0.12	3.6-6.0	Low-----------	0.28	3	.5-2
	9-33	25-35	1.30-1.45	2.0-6.0	0.06-0.10	3.6-5.5	Low-----------	0.32		
	33-60	40-75	1.20-1.40	0.6-2.0	0.05-0.08	3.6-5.5	Moderate-----	0.20		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
14B--------------- Elk	B	Occasional	Brief-----	Nov-May	>6.0	---	---	>60	---	Moderate	Moderate.
15B--------------- Gladden	B	Occasional	Very brief to brief.	Nov-May	>6.0	---	---	>60	---	High-----	High.
18A--------------- Auxvasse	D	Rare----------	---	---	1.0-2.0	Perched	Nov-May	>60	---	High-----	High.
19B--------------- Midco	A	Frequent----	Very brief	Nov-May	>6.0	---	---	>60	---	Low-------	Moderate.
24B--------------- Secesh	B	Occasional	Very brief	Nov-May	>6.0	---	---	>60	---	Low-------	Moderate.
26B--------------- Wideman	A	Frequent----	Very brief	Nov-May	>6.0	---	---	>60	---	Low-------	Low.
38B, 38C---------- Captina	C	None---------	---	---	2.0-3.0	Perched	Dec-Apr	>60	---	Moderate	High.
42C, 42D, 42F----- Clarksville	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High.
62F--------------- Irondale	C	None---------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
70F*:											
Gasconade--------	D	None---------	---	---	>6.0	---	---	4-20	Hard	High-----	Low.
Rock outcrop.											
76C, 76D, 76F----- Poynor	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High.
80C--------------- Wilderness	C	None---------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	Moderate	High.
81D*:											
Wilderness-------	C	None---------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	Moderate	High.
Clarksville------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Auxvasse	Fine, montmorillonitic, mesic Aeric Albaqualfs
Captina	Fine-silty, siliceous, mesic Typic Fragiudults
Clarksville	Loamy-skeletal, siliceous, mesic Typic Paleudults
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Gasconade	Clayey-skeletal, mixed, mesic Lithic Hapludolls
Gladden	Coarse-loamy, siliceous, mesic Fluventic Dystrochrepts
Irondale	Loamy-skeletal, mixed, mesic Typic Hapludults
Midco	Loamy-skeletal, siliceous, nonacid, mesic Typic Udifluvents
Poynor	Loamy-skeletal over clayey, siliceous, mesic Typic Paleudults
Secesh	Fine-loamy, siliceous, mesic Ultic Hapludalfs
Wideman	Sandy, siliceous, mesic Typic Udifluvents
Wilderness	Loamy-skeletal, siliceous, mesic Typic Fragiudalfs

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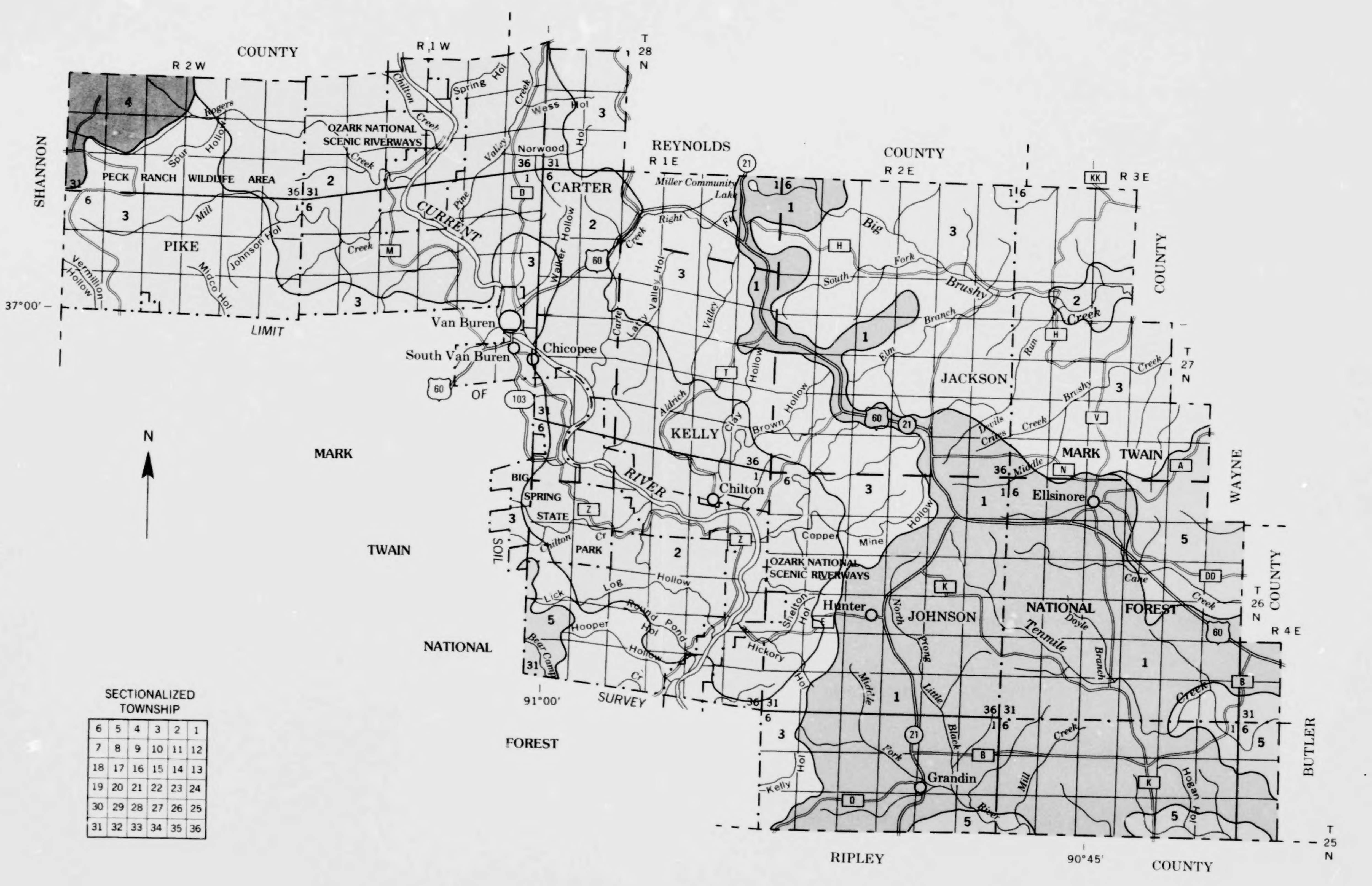
MAPS

TRANSPOSED TO

END OF VOLUME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PECK RANCH WILDLIFE AREA
PIKE
CARTER
Norwood
Miller Community Lake
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Chicopee
KELLY
JACKSON
MARK TWAIN
Ellsinore
Chilton
BIG SPRING STATE PARK
Hunter
JOHNSON
NATIONAL FOREST
Grandin
CURRENT
RIVER
LIMIT OF SOIL SURVEY
MARK TWAIN NATIONAL FOREST
N
SECTIONALIZED TOWNSHIP
6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND *

1	CAPTINA-CLARKSVILLE-WILDERNESS association: Deep, gently sloping to very steep, moderately well drained and somewhat excessively drained, silty and very cherty soils
2	POYNOR association: Deep, gently sloping to very steep, well drained, very cherty soils
3	CLARKSVILLE association: Deep, gently sloping to very steep, somewhat excessively drained, very cherty soils
4	IRONDALE-CLARKSVILLE association: Moderately deep and deep, gently sloping to very steep, well drained and somewhat excessively drained, very cobbly and very cherty soils
5	CLARKSVILLE-CAPTINA-POYNOR association: Deep, gently sloping to very steep, somewhat excessively drained to moderately well drained, very cherty and silty soils

* The texture given in the descriptive headings refers to the surface layer of the major soils in the associations.

Compiled 1989

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
MISSOURI AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

CARTER COUNTY, MISSOURI
NORTHERN AND EASTERN PARTS

Scale 1:190,080

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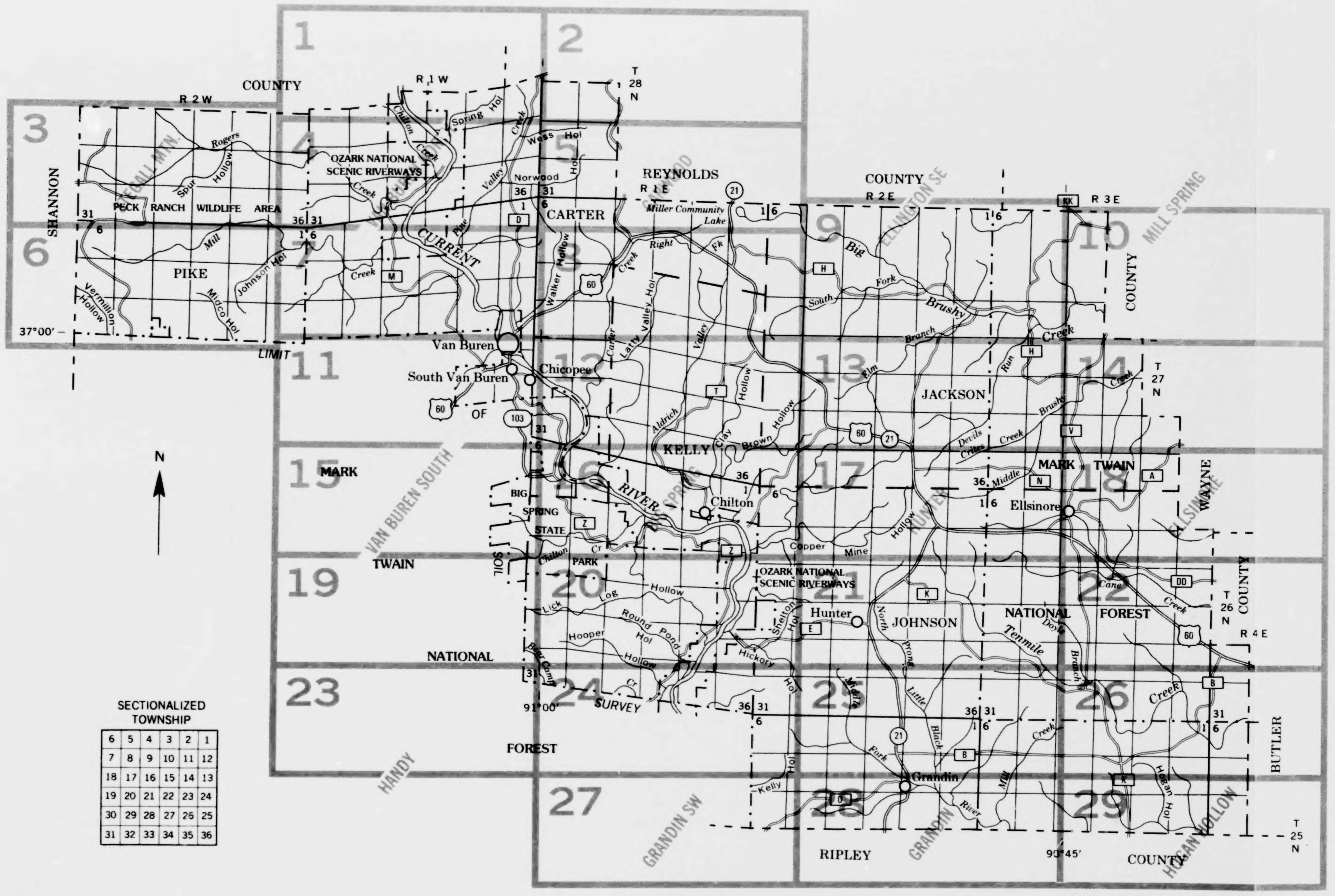
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KELLY
Chilton
JACKSON
MARK TWAIN
Ellsinore
T 27 N
WAYNE
COUNTY
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HANDY
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GRANDIN
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MILL SPRING
ELLSINORE
HARGAN HOLLOW
N
SECTIONALIZED TOWNSHIP
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7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
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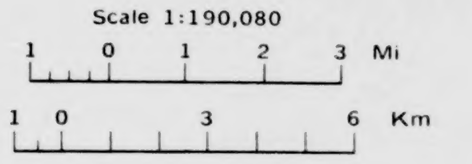
31 32 33 34 35 36

INDEX TO MAP SHEETS

CARTER COUNTY, MISSOURI
NORTHERN AND EASTERN PARTS

Scale 1:190,080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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE

CARTER COUNTY, MISSOURI
NORTHERN AND EASTERN PARTS

MISSOURI AGRICULTURAL EXPERIMENT STATION

SOIL LEGEND

Map symbols consist of a combination of numbers and a letter. The numbers represent the kind of soil. The capital letter following these numbers indicates the class of slope.

SYMBOL	NAME
14B	Elk silt loam, 1 to 4 percent slopes
15A	Gladden sandy loam, sandy substratum, 0 to 3 percent slopes
18A	Auxvasse silt loam, 0 to 3 percent slopes
19B	Midco very cherty loam, 1 to 4 percent slopes
24B	Secesh silt loam, 1 to 4 percent slopes
26B	Wideman fine sandy loam, 1 to 4 percent slopes
38B	Captina silt loam, 2 to 5 percent slopes
38C	Captina silt loam, 5 to 9 percent slopes
42C	Clarksville very cherty silt loam, 3 to 9 percent slopes
42D	Clarksville very cherty silt loam, 9 to 14 percent slopes
42F	Clarksville very cherty silt loam, 14 to 40 percent slopes
62F	Irondale very cobbly silt loam, 14 to 40 percent slopes, extremely stony
70F	Gasconade-Rock outcrop complex, 14 to 50 percent slopes
76C	Poynor very cherty silt loam, 3 to 9 percent slopes
76D	Poynor very cherty silt loam, 9 to 14 percent slopes
76F	Poynor very cherty silt loam, 14 to 40 percent slopes
80C	Wilderness very cherty silt loam, 3 to 9 percent slopes
81D	Wilderness-Clarksville complex, 9 to 14 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES	
National, state or province	—— - -
County or parish	—— -
Minor civil division	— — —
Reservation (national forest or park, state forest or park, and large airport)	—— · ——
Land grant	—— ·· ——
Limit of soil survey (label)	——
Field sheet matchline and neatline	——
AD HOC BOUNDARY (label)	Swift Airport
Small airport, airfield, park, oilfield, cemetery, or flood pool	FLOOD POOL LINE
STATE COORDINATE TICK	——┴——
LAND DIVISION CORNER (sections and land grants)	└ ┴ ┼ ┬┴
ROADS	
Divided (median shown if scale permits)	═══
Other roads	——
Trail	- - - - -
ROAD EMBLEM & DESIGNATIONS	
Interstate	21
Federal	173
State	28
County, farm or ranch	1283
RAILROAD	—┼—┼—┼—
POWER TRANSMISSION LINE (normally not shown)	···•···•···•···
PIPE LINE (normally not shown)	├─┤├─┤├─┤├─┤
FENCE (normally not shown)	—×———×—
LEVEES	
Without road	ıııııııııııııı
With road	
With railroad	
DAMS	
Large (to scale)	
Medium or Small	water w
PITS	
Gravel pit	⚒
Mine or quarry	⚒

MISCELLANEOUS CULTURAL FEATURES	
Farmstead, house (omit in urban areas)	•
Church	
School	
Indian mound (label)	Indian Mound
Located object (label)	Tower
Tank (label)	• Gas
Wells, oil or gas	
Windmill	
Kitchen midden	

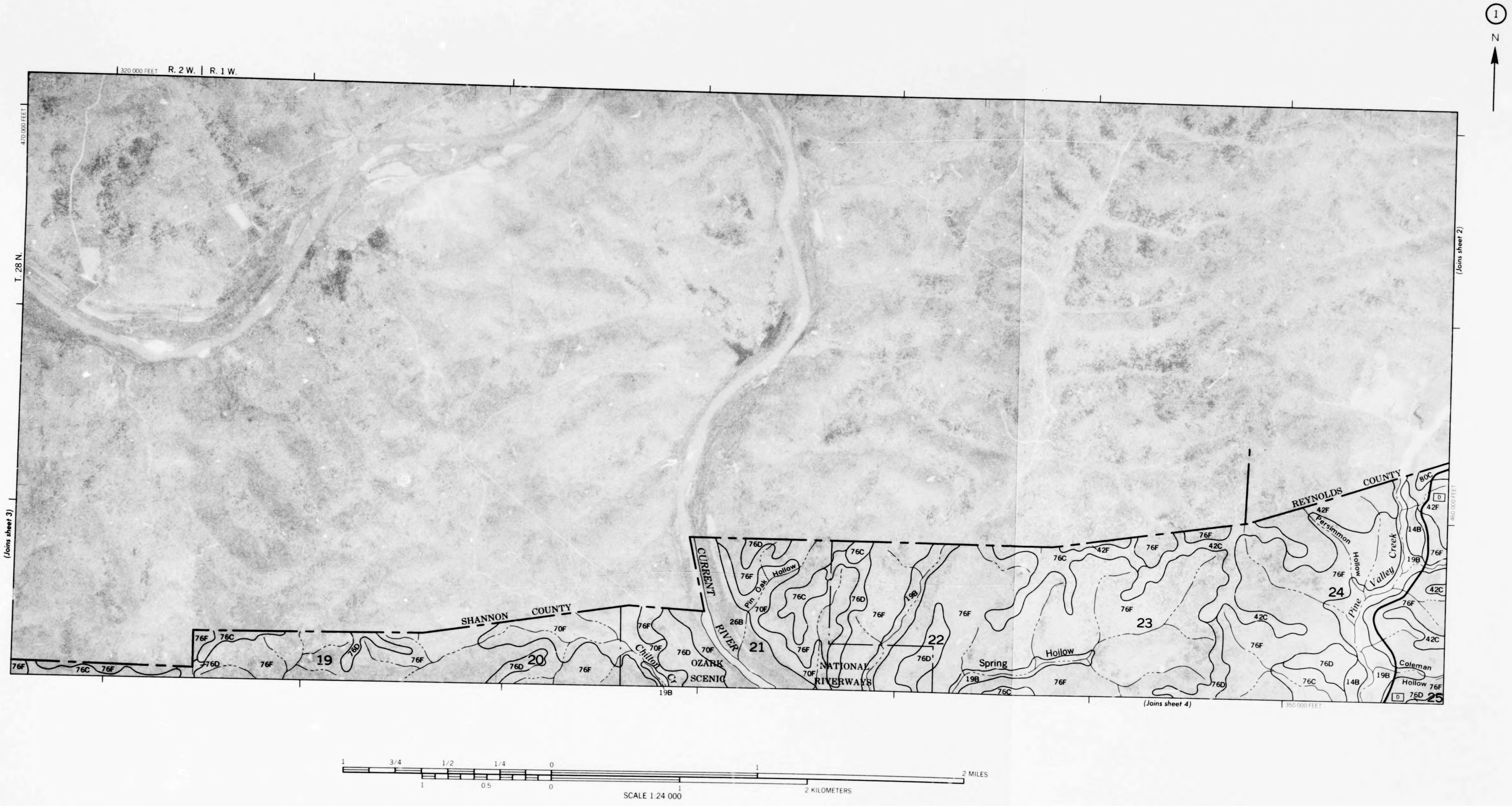
WATER FEATURES

DRAINAGE	
Perennial, double line	
Perennial, single line	
Intermittent	
Drainage end	
Canals or ditches	
Double-line (label)	CANAL
Drainage and/or irrigation	→ · →
LAKES, PONDS AND RESERVOIRS	
Perennial	water w
Intermittent	int i
MISCELLANEOUS WATER FEATURES	
Marsh or swamp	
Spring	
Well, artesian	
Well, irrigation	
Wet spot	

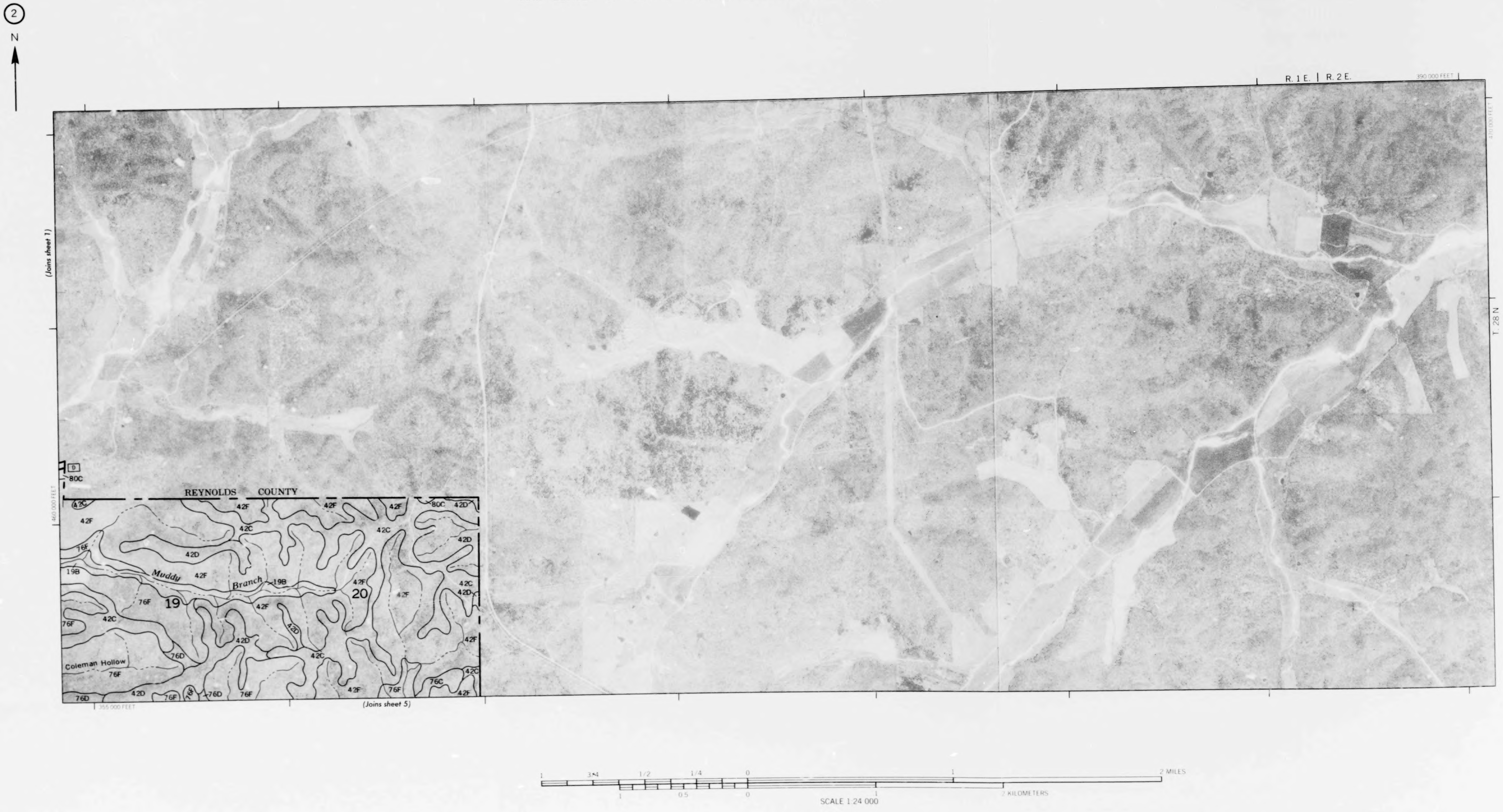
SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS	38B 38C
ESCARPMENTS	
Bedrock (points down slope)	▾▾▾▾▾▾▾▾▾▾▾▾
Other than bedrock (points down slope)	············
SHORT STEEP SLOPE	· · · · · · · ·
GULLY	
DEPRESSION OR SINK	◊
SOIL SAMPLE (normally not shown)	Ⓢ
MISCELLANEOUS	
Blowout	◡
Clay spot	※
Gravelly spot	∴
Gumbo, slick or scabby spot (sodic)	ø
Dumps and other similar non soil areas	≡
Prominent hill or peak	
Rock outcrop (includes sandstone and shale)	▾
Saline spot	+
Sandy spot	∷
Severely eroded spot	÷
Slide or slip (tips point upslope)	)))
Stony spot, very stony spot	0 00

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 1

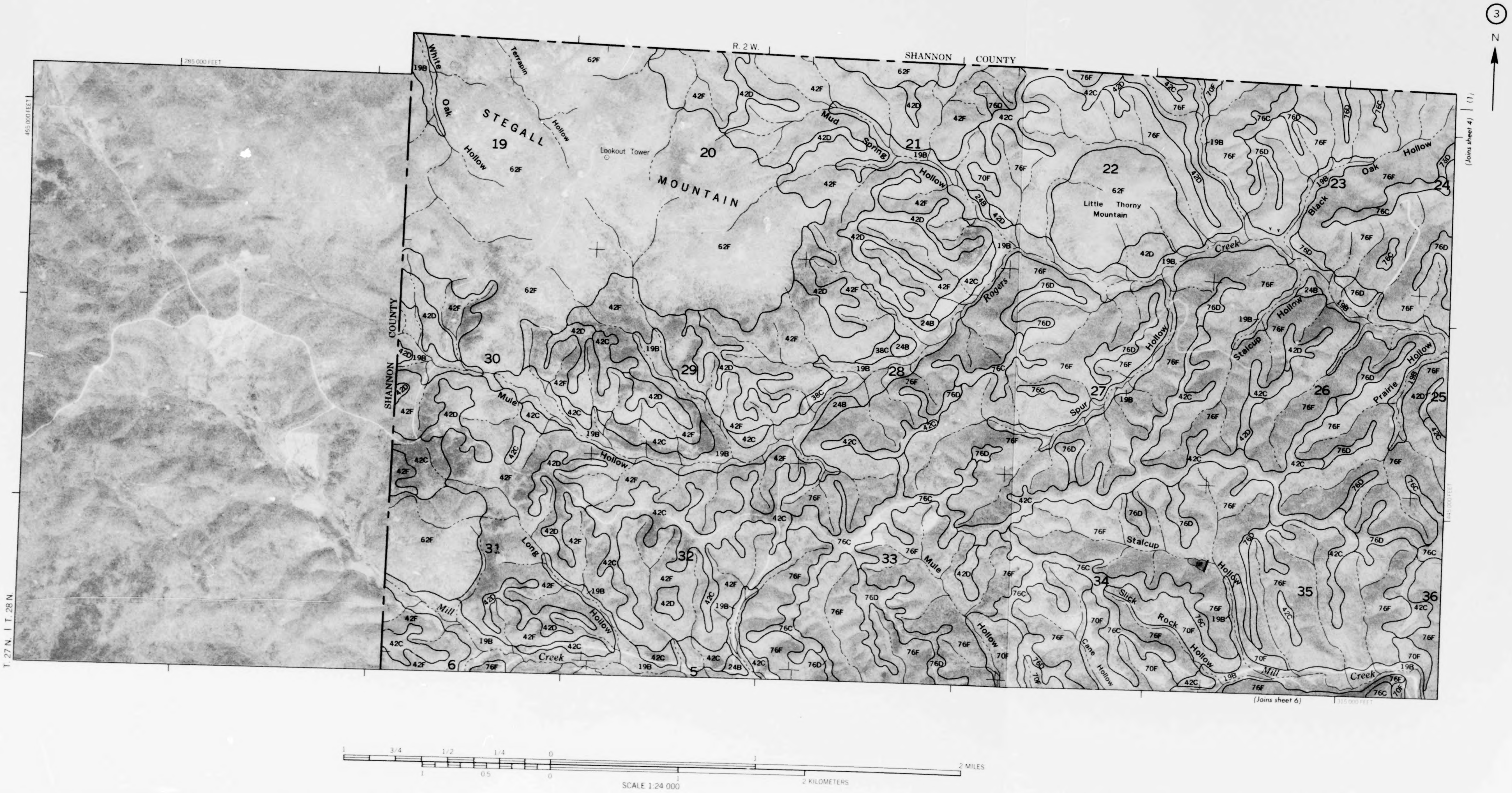

①
N
320 000 FEET
R. 2 W.
R. 1 W.
470 000 FEET
T. 28 N.
(Joins sheet 3)
(Joins sheet 2)
(Joins sheet 4)
350 000 FEET
SHANNON COUNTY
REYNOLDS COUNTY
CURRENT RIVER
OZARK SCENIC NATIONAL RIVERWAYS
Pin Oak Hollow
Chilton Cr.
Spring Hollow
Persimmon Hollow
Pine Valley Creek
Coleman Hollow
19
20
21
22
23
24
25
14B
19B
26B
42C
42F
70F
76C
76D
76F
80C
D
SCALE 1:24 000
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 2


②
N
R. 1 E.
R. 2 E.
390 000 FEET
470 000 FEET
T. 28 N.
(Joins sheet 1)
460 000 FEET
D
80C
REYNOLDS COUNTY
42C
42F
42F
42F
42F
80C
42D
42C
42C
42D
76F
42D
19B
Muddy
42F
Branch
19B
42F
20
42F
42C
42D
76F
19
42F
42C
76F
42D
42D
42C
42F
76D
Coleman Hollow
76F
42C
76C
42F
76F
76D
42D
76F
76F
76D
76F
42F
355 000 FEET
(Joins sheet 5)
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

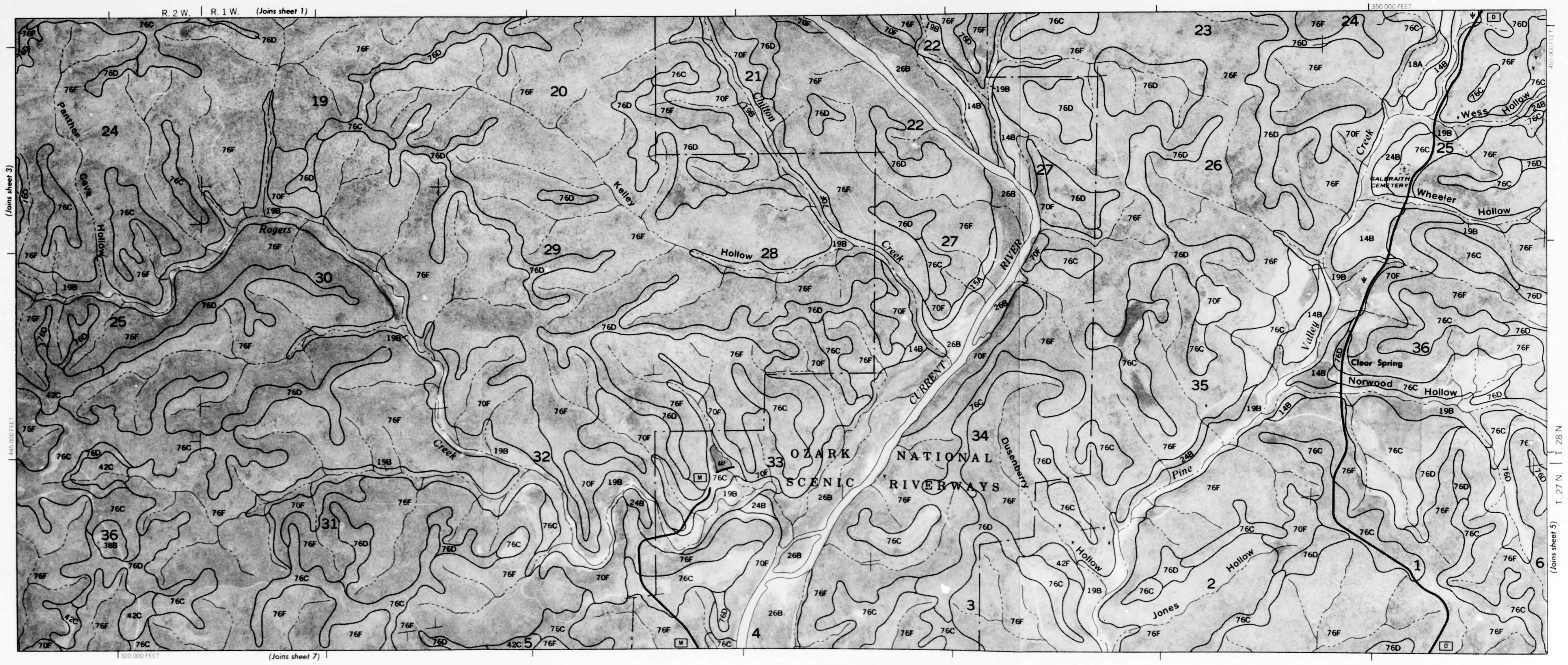
CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 3

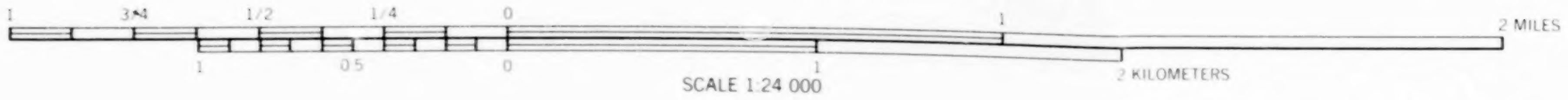
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 3


③
N
R. 2 W.
SHANNON COUNTY
SHANNON COUNTY
285 000 FEET
455 000 FEET
(Joins sheet 4)
(Joins sheet 6)
T. 27 N. | T. 28 N.
STEGALL MOUNTAIN
Lookout Tower
White Oak Hollow
Terrapin Hollow
Mud Spring Hollow
Little Thorny Mountain
Black Oak Hollow
Rogers Creek
Stalcup Hollow
Spur Hollow
Prairie Hollow
Mule Hollow
Long Hollow
Mill Creek
Slick Rock Hollow
Cane Hollow
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
6
5
19B
24B
38C
42C
42D
42F
62F
70F
76C
76D
76F
SCALE 1:24 000
1 3/4 1/2 1/4 0
2 MILES
1 0.5 0
2 KILOMETERS

④
N

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 4

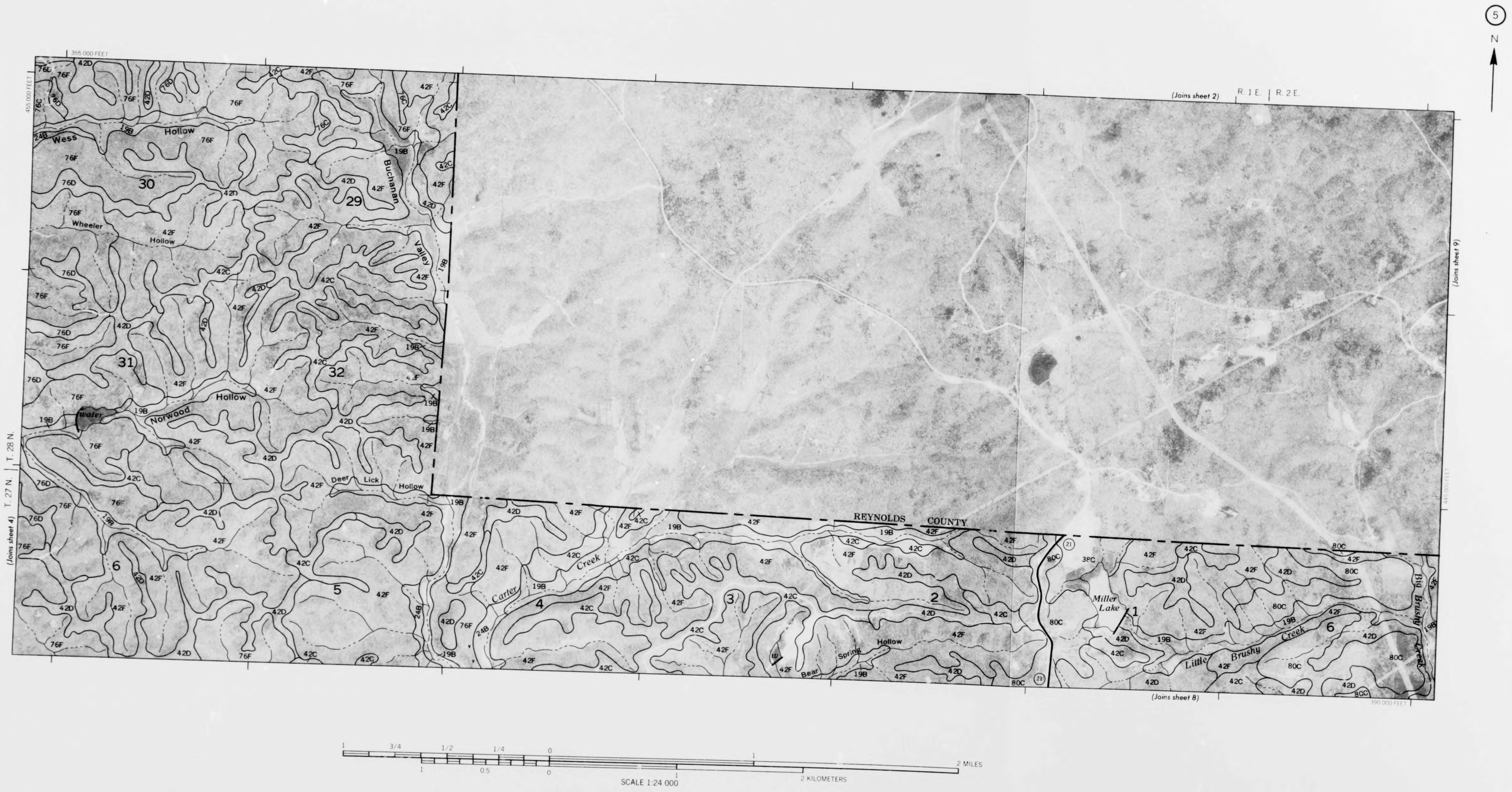

R. 2 W.
R. 1 W.
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 7)
350 000 FEET
320 000 FEET
445 000 FEET
T. 28 N.
T. 27 N.
Panther
Cave
Hollow
Rogers
Creek
Kelley
Hollow
Chilton
Creek
CURRENT
RIVER
OZARK NATIONAL
SCENIC RIVERWAYS
Dusenberry
Hollow
Pine
Valley
Creek
Wess
Hollow
GALBRAITH CEMETERY
Wheeler
Hollow
Clear Spring
Norwood
Hollow
Jones
Hollow
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
1
2
3
4
5
6
76C
76D
76F
70F
19B
14B
26B
24B
42C
18A
38B


1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SCALE 1:24 000

CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 4

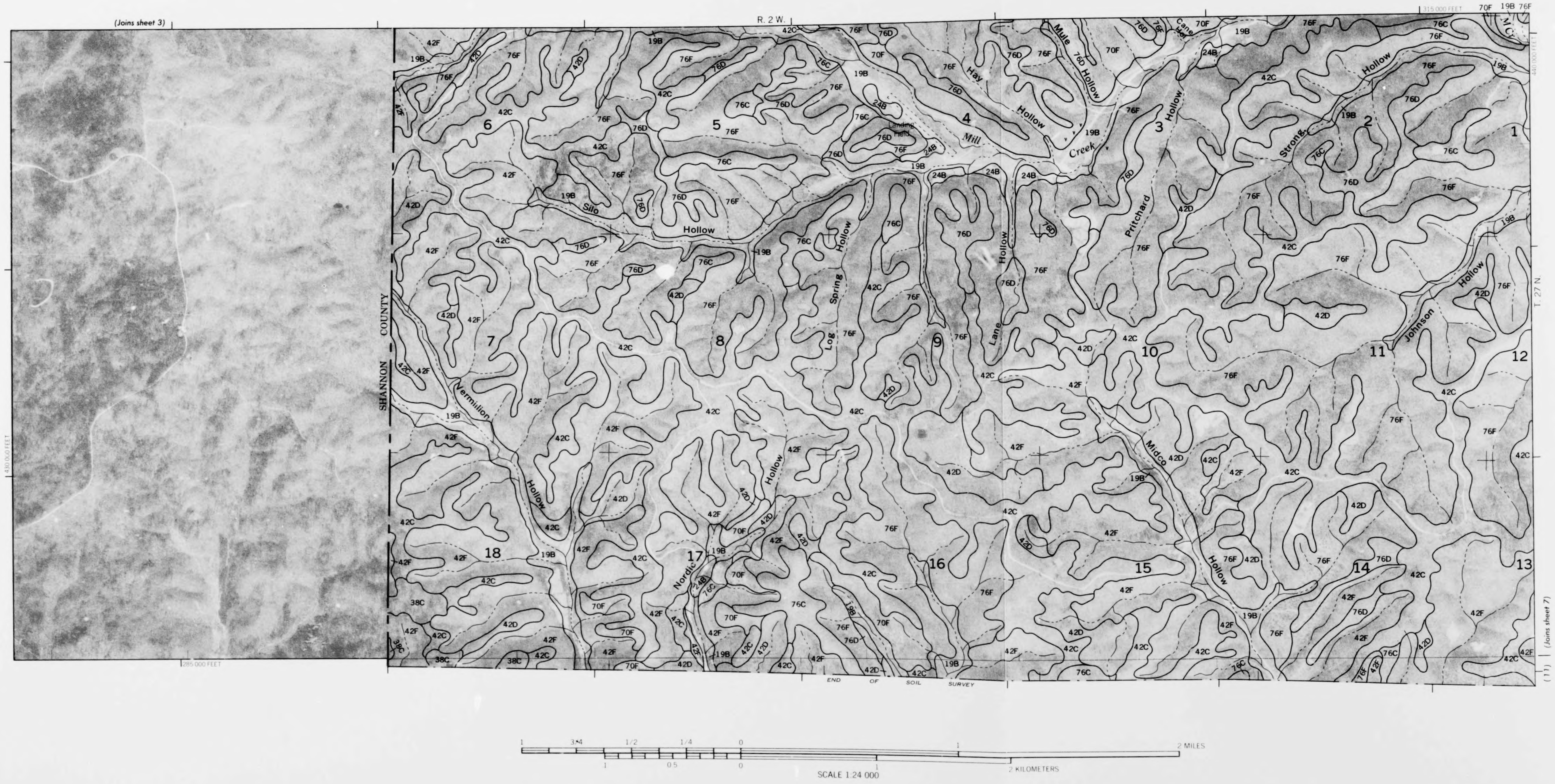
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 5


5
N
355 000 FEET
455 000 FEET
(Joins sheet 2)
R. 1 E.
R. 2 E.
(Joins sheet 9)
(Joins sheet 4)
(Joins sheet 8)
T. 28 N.
T. 27 N.
REYNOLDS COUNTY
Wess Hollow
Wheeler Hollow
Buchanan Valley
Norwood Hollow
Deer Lick Hollow
Carter Creek
Bear Spring Hollow
Miller Lake
Little Brushy Creek
Big Brushy Creek
water
21
30
29
31
32
6
5
4
3
2
1
6
76C
76D
76F
42C
42D
42F
19B
24B
80C
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

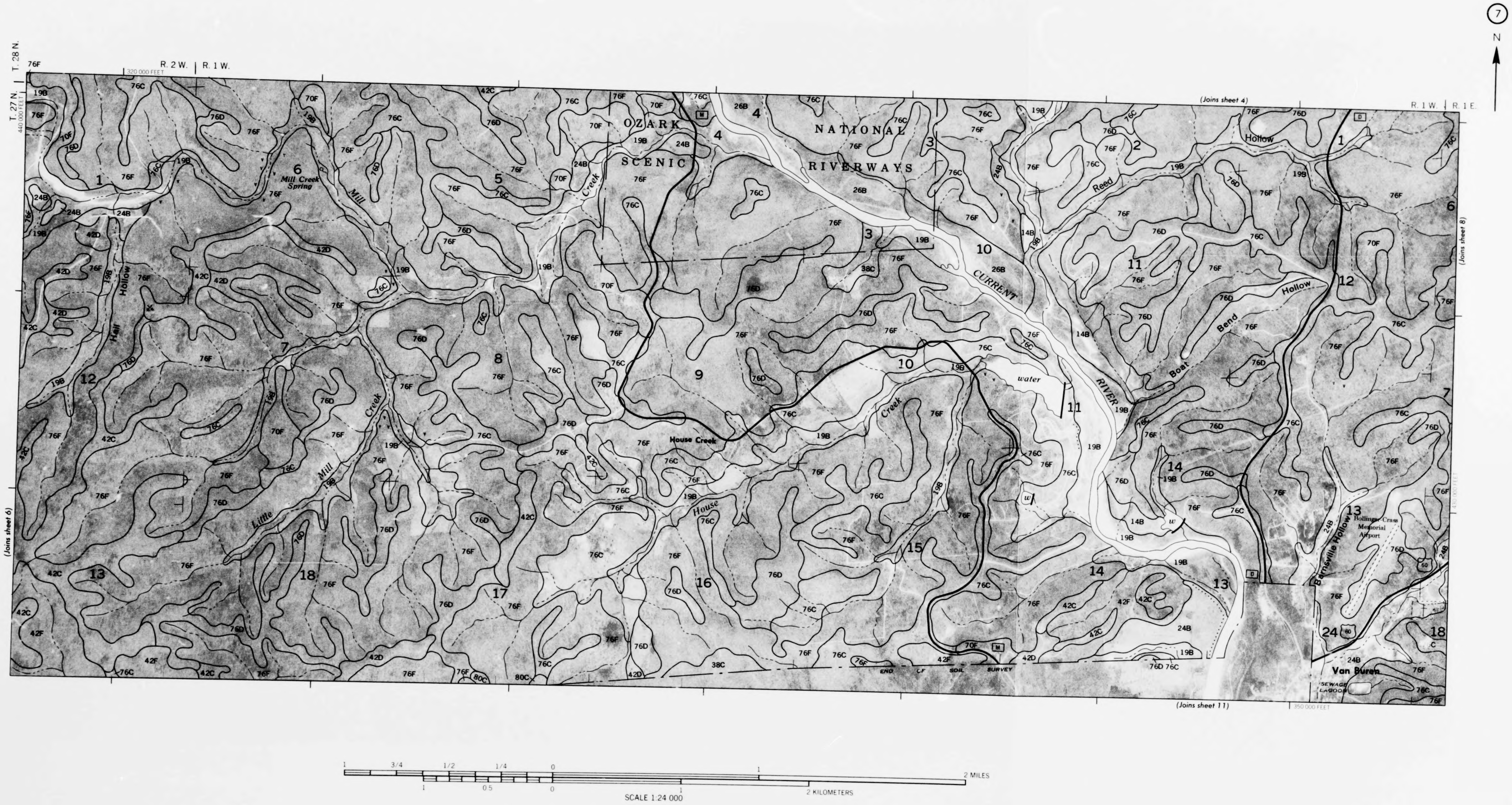
⑥

N

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 6

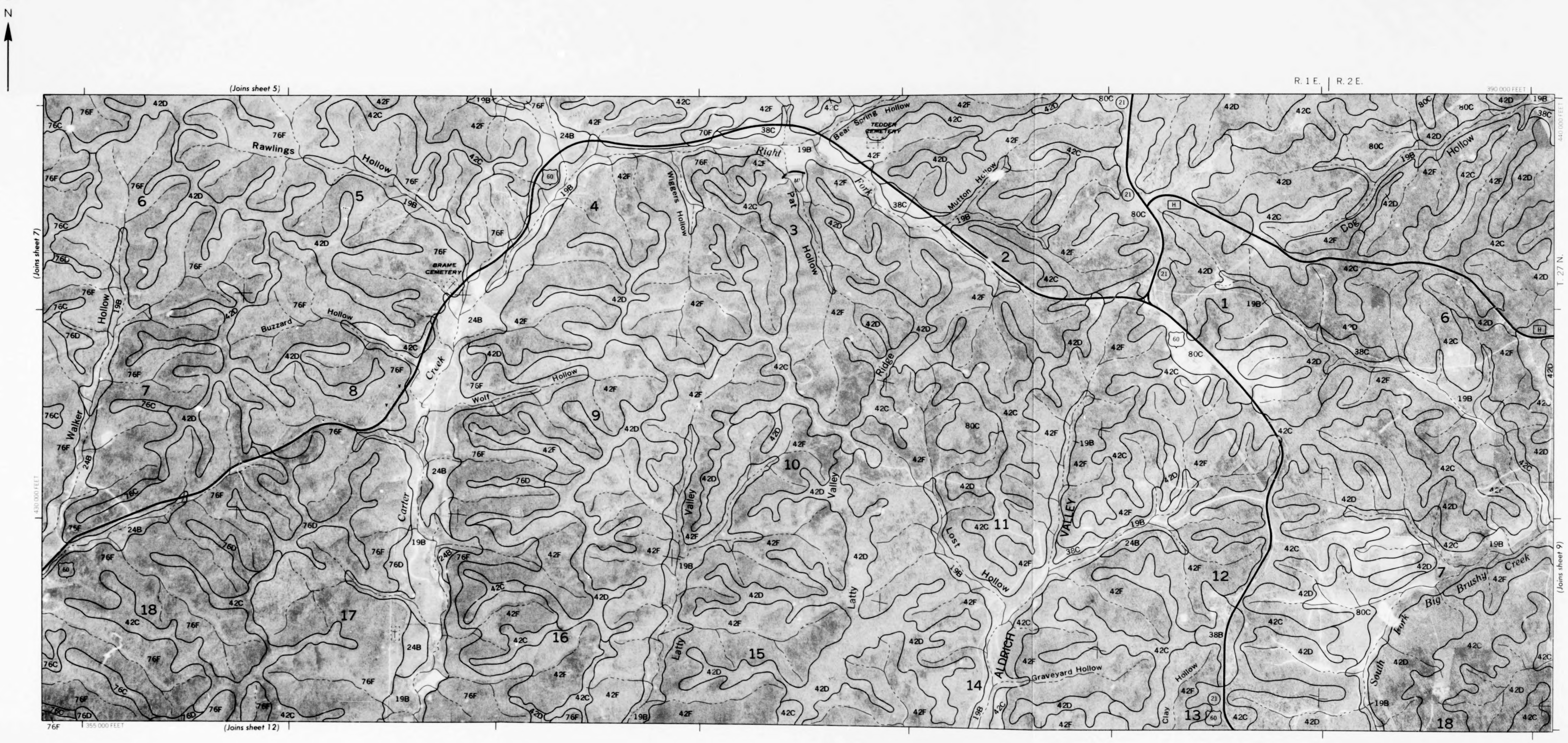

(Joins sheet 3)
R. 2 W.
315 000 FEET
T. 27 N.
SHANNON COUNTY
(Joins sheet 7)
(11)
295 000 FEET
END OF SOIL SURVEY
Silo Hollow
Hay Hollow
Mill Creek
Mule Hollow
Cane Hollow
Pritchard Hollow
Strong Hollow
Log Spring Hollow
Lane Hollow
Johnson Hollow
Vermillion Hollow
Nordic Hollow
Midco Hollow
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19B
24B
38C
42C
42D
42F
70F
76C
76D
76F
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 7


7
N
R. 2 W. | R. 1 W.
R. 1 W. | R. 1 E.
T. 28 N.
T. 27 N.
320 000 FEET
440 000 FEET
350 000 FEET
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 11)
OZARK SCENIC
NATIONAL RIVERWAYS
CURRENT RIVER
Mill Creek Spring
Mill Creek
Hall Hollow
Little Mill Creek
House Creek
Reed Hollow
Boat Bend Hollow
Barnesville Hollow
Bollinger Crane Memorial Airport
Van Buren
SEWAGE LAGOON
water
END OF SOIL SURVEY
19B
14B
24B
26B
38C
42C
42D
42F
70F
76C
76D
76F
80C
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

⑧

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 8


N
(Joins sheet 5)
R. 1 E. | R. 2 E.
390 000 FEET
440 000 FEET
T. 27 N.
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 12)
430 000 FEET
355 000 FEET
Rawlings Hollow
Buzzard Hollow
Walker Hollow
Carter Creek
Wolf Hollow
Wiggers Hollow
Right Fork
Pat Hollow
Bear Spring Hollow
TEDDER CEMETERY
BRAME CEMETERY
Mutton Hollow
Ridge
Latty Valley
Lost Hollow
ALDRICH VALLEY
Graveyard Hollow
Clay Hollow
Coe Hollow
Big Brushy Creek
South Fork
60
21
H
19B
24B
38B
38C
42C
42D
42F
70F
76C
76D
76F
80C
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

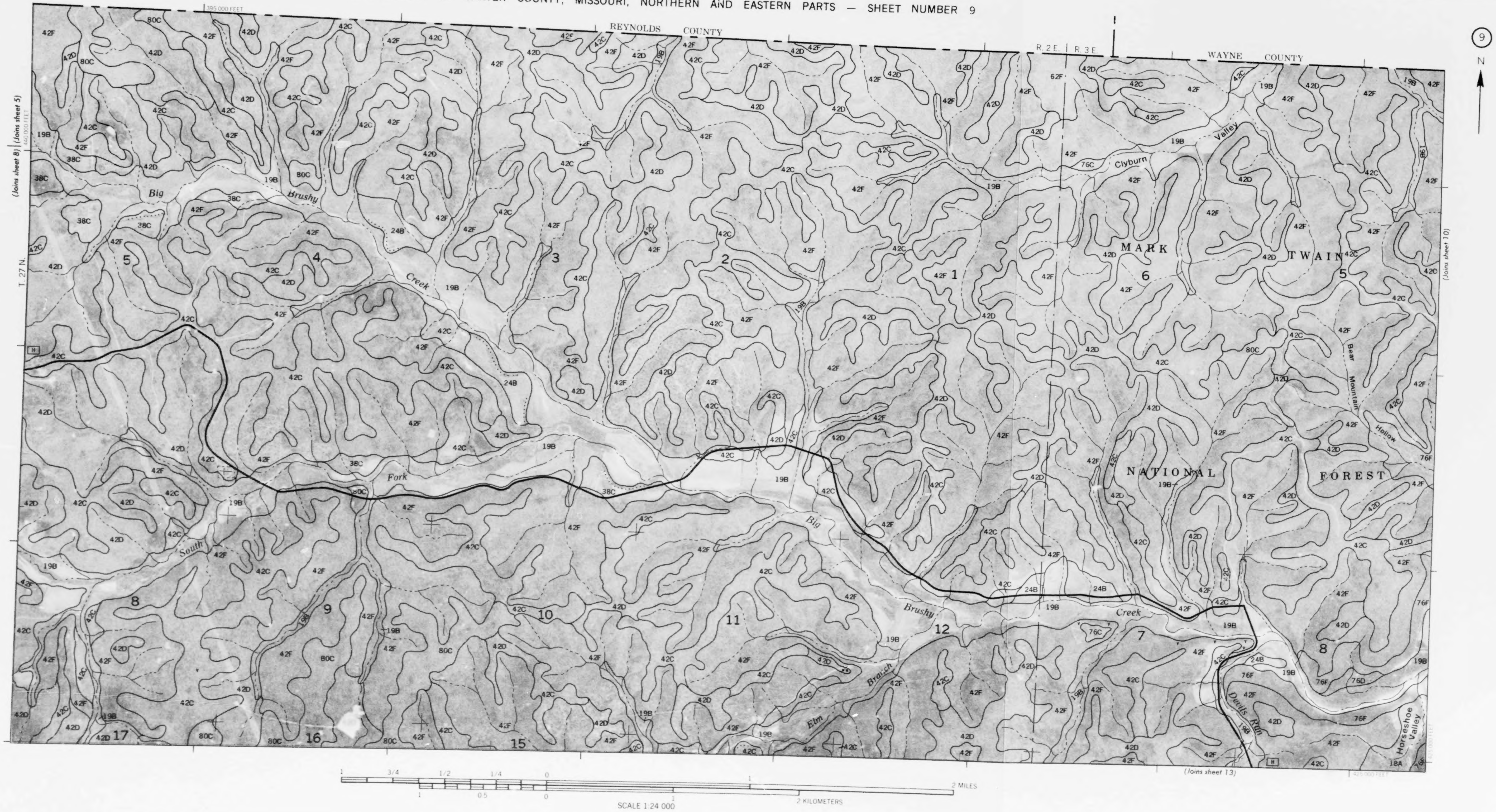
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

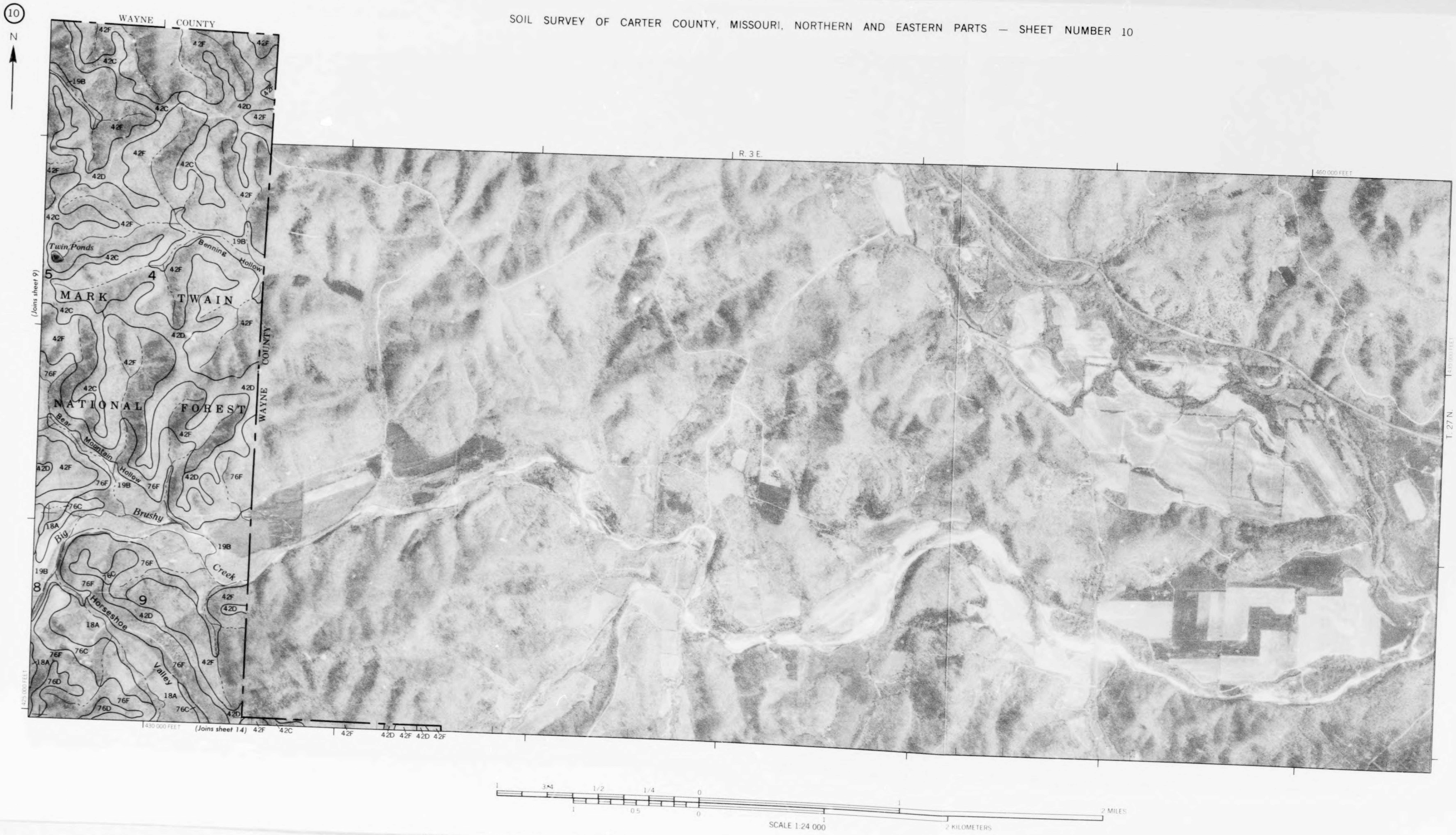
CARTER COUNTY, MISSOURI, N AND E PARTS NO. 8

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 9


REYNOLDS COUNTY
WAYNE COUNTY
R. 2 E.
R. 3 E.
T. 27 N.
395 000 FEET
425 000 FEET
(Joins sheet 8)
(Joins sheet 5)
(Joins sheet 10)
(Joins sheet 13)
9
N
MARK TWAIN NATIONAL FOREST
Big Brushy Creek
South Fork
Big Brushy Creek
Clyburn Valley
Bear Mountain Hollow
Elm Branch
Devils Run
Horseshoe Valley
1
2
3
4
5
6
5
8
9
10
11
12
7
8
15
16
17
42F
42D
42C
80C
19B
38C
24B
62F
76C
76F
76D
18A
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

SCALE 1:24 000

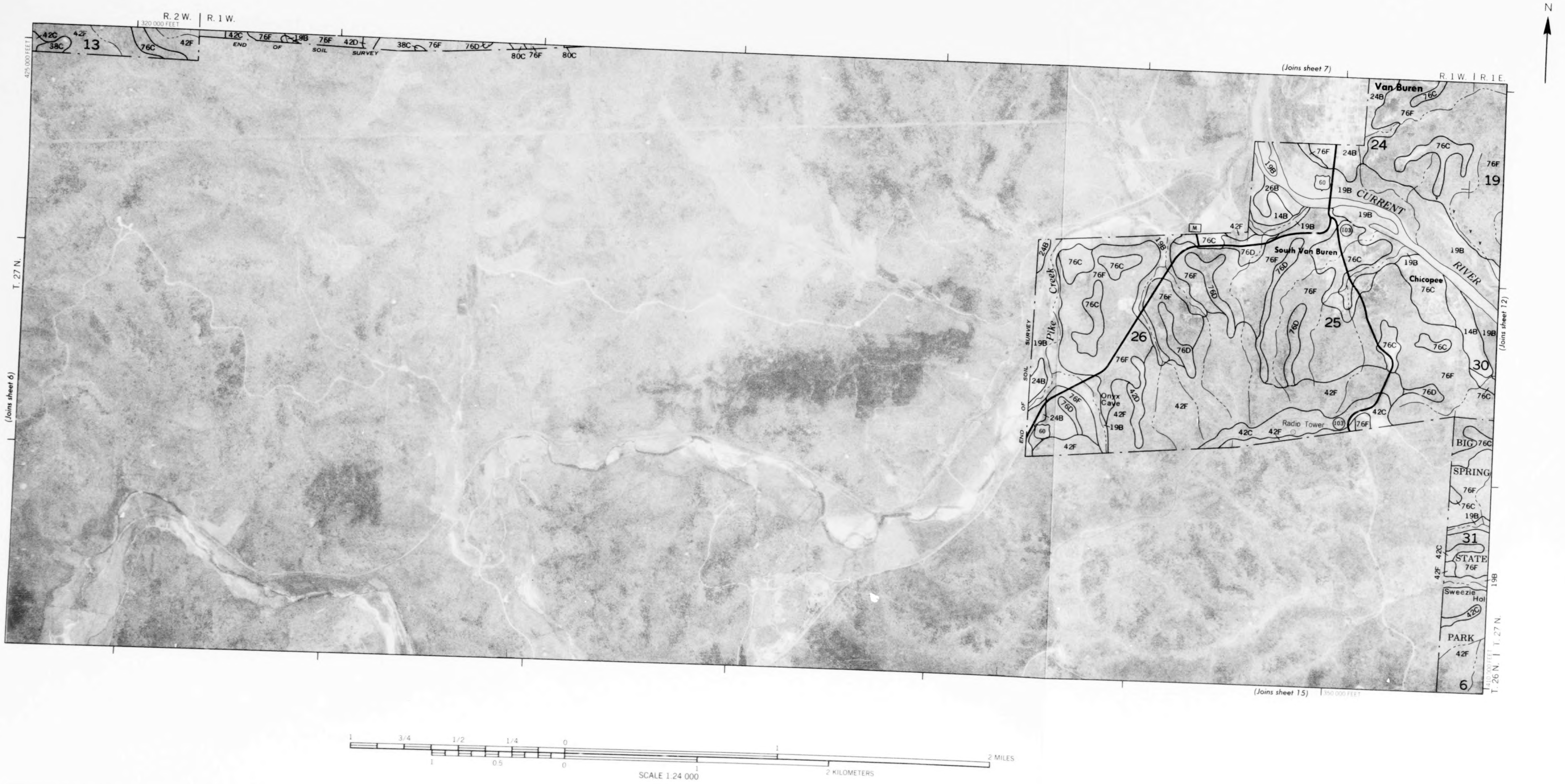
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 10


⑩
N
WAYNE COUNTY
R. 3 E.
460 000 FEET
T. 27 N.
(Joins sheet 9)
(Joins sheet 14)
430 000 FEET
Twin Ponds
Benning Hollow
MARK TWAIN NATIONAL FOREST
Bear Mountain Hollow
Big Brushy Creek
Horseshoe Valley
5
4
8
9
42F
42C
42D
19B
18A
76C
76D
76F
1
3/4
1/2
1/4
0
1
0.5
0
1
1
2 MILES
2 KILOMETERS
SCALE 1:24 000

CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 10

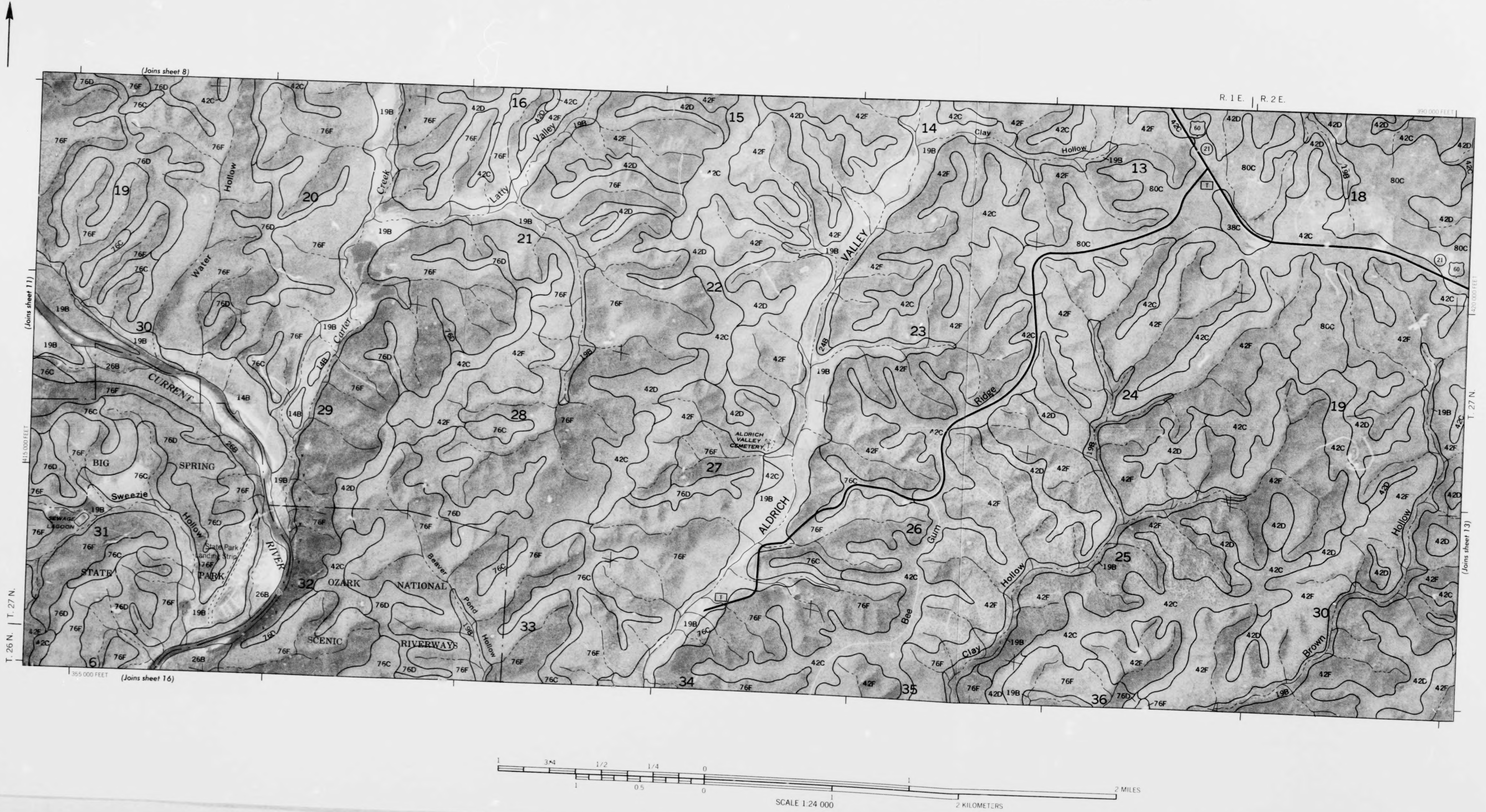
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 11

⑪


N
R. 2 W.
R. 1 W.
320 000 FEET
END OF SOIL SURVEY
13
42C
42F
38C
76C
76F
19B
76F
42D
38C
76D
80C
80C
(Joins sheet 7)
R. 1 W.
R. 1 E.
Van Buren
24B
24
19
CURRENT RIVER
60
M
103
South Van Buren
Chicopee
Pike Creek
26
25
30
14B
19B
76D
Onyx Cave
Radio Tower
BIG SPRING STATE PARK
31
Sweezie Hol
6
T. 27 N.
T. 26 N.
(Joins sheet 6)
(Joins sheet 12)
(Joins sheet 15)
350 000 FEET
SCALE 1:24 000
2 MILES
2 KILOMETERS

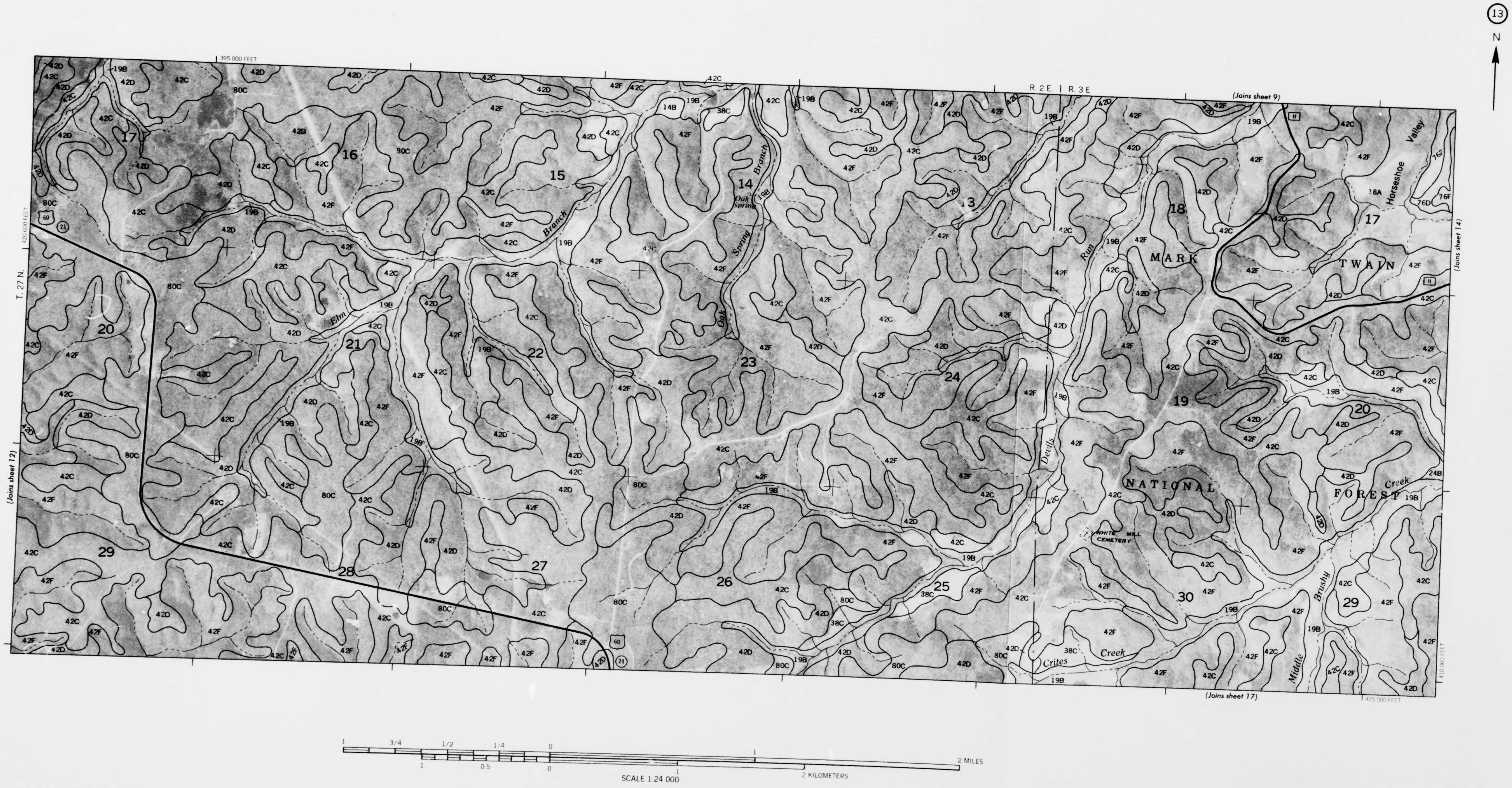
⑫

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 12

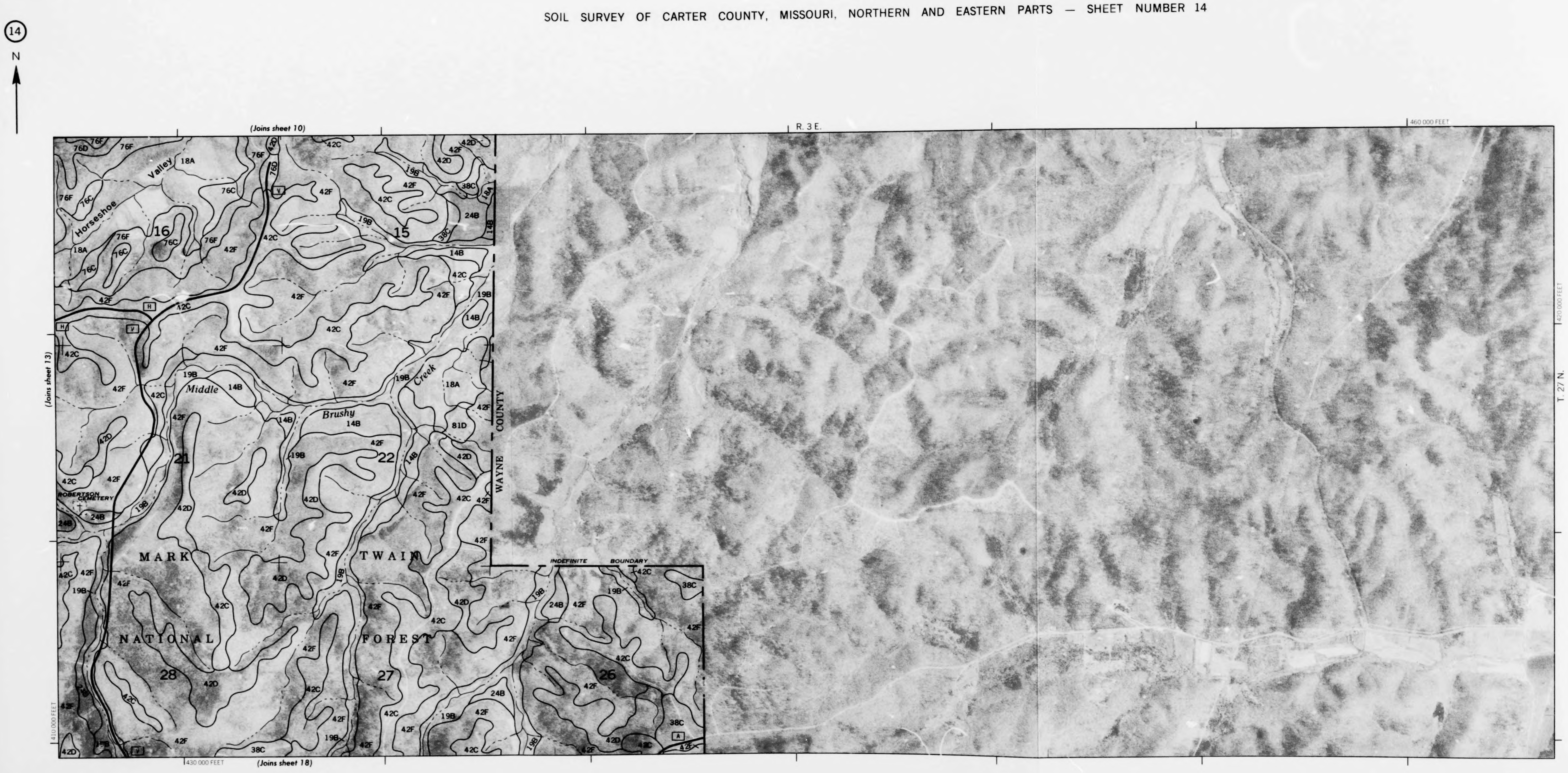

N
(Joins sheet 8)
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 16)
R. 1 E. | R. 2 E.
T. 27 N.
T. 26 N. | T. 27 N.
355 000 FEET
390 000 FEET
420 000 FEET
415 000 FEET
CURRENT RIVER
BIG SPRING STATE PARK
Sweezie Hollow
SEWAGE LAGOON
State Park Landing Strip
OZARK NATIONAL SCENIC RIVERWAYS
Water Hollow
Carter Creek
Latty Valley
ALDRICH VALLEY
ALDRICH VALLEY CEMETERY
Clay Hollow
Ridge
Gum Hollow
Bee Clay
Beaver Pond Hollow
Brown Hollow
60
21
J
19B
42C
42D
42F
76C
76D
76F
80C
14B
24B
26B
38C
6
13
14
15
16
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 12

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 13


13
N
395 000 FEET
420 000 FEET
410 000 FEET
425 000 FEET
R.2E. | R.3E.
(Joins sheet 9)
(Joins sheet 14)
(Joins sheet 17)
(Joins sheet 12)
T. 27 N.
Branch
Oak Spring Branch
Elm
Devils Run
Horseshoe Valley
MARK TWAIN
NATIONAL FOREST
WHITE MILL CEMETERY
Crites Creek
Middle Brushy Creek
60
21
H
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
42C
42D
42F
19B
80C
14B
38C
18A
76D
76F
24B
1
3/4
1/2
1/4
0
0.5
2 MILES
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 14


⑭
N
(Joins sheet 10)
R. 3 E.
460 000 FEET
420 000 FEET
T. 27 N.
(Joins sheet 13)
(Joins sheet 18)
430 000 FEET
410 000 FEET
Horseshoe Valley
Middle Brushy Creek
ROBERTSON CEMETERY
WAYNE COUNTY
INDEFINITE BOUNDARY
MARK TWAIN NATIONAL FOREST
16
15
21
22
28
27
26
76D
76F
76C
18A
42C
42F
42D
19B
14B
38C
24B
81D

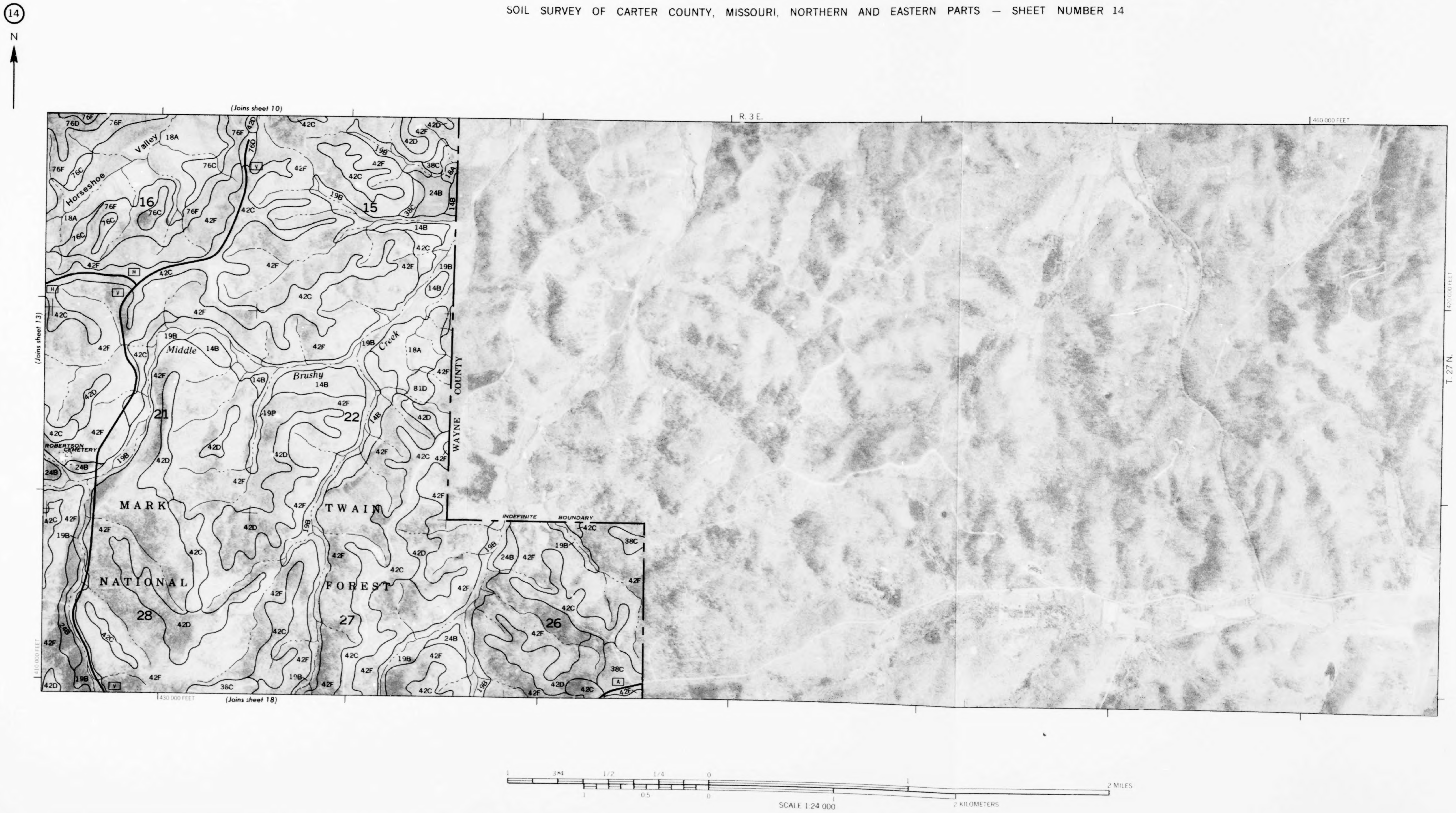
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

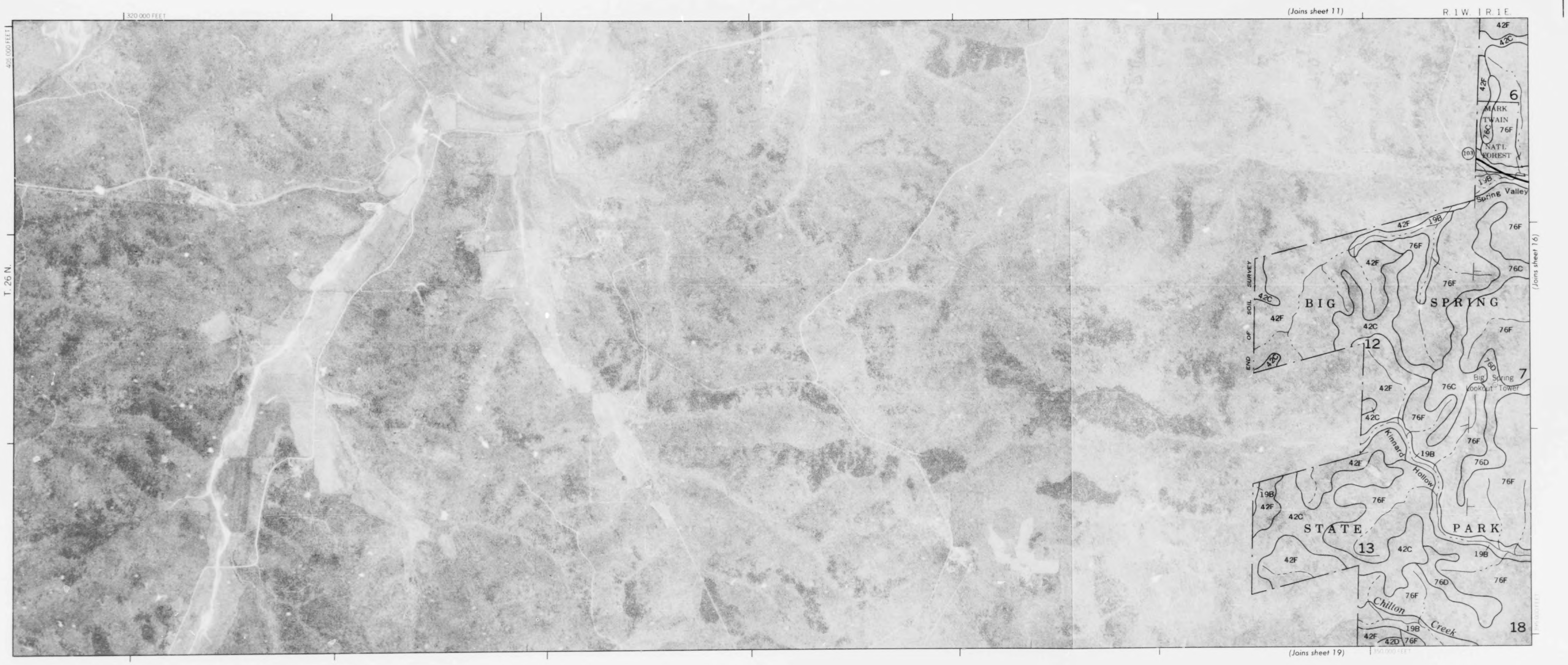
⑭

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 14


N
(Joins sheet 10)
(Joins sheet 13)
(Joins sheet 18)
R. 3 E.
T. 27 N.
460 000 FEET
430 000 FEET
410 000 FEET
420 000 FEET
Horseshoe Valley
Middle Brushy Creek
ROBERTSON CEMETERY
WAYNE COUNTY
INDEFINITE BOUNDARY
MARK TWAIN NATIONAL FOREST
16
15
21
22
28
27
26
H
V
A
76D
76F
76C
18A
42D
42C
42F
19B
38C
24B
14B
81D
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 15

⑮


N
(Joins sheet 11)
R. 1 W. | R. 1 E.
120 000 FEET
400 000 FEET
T. 26 N.
42F
42C
6
MARK TWAIN NAT'L FOREST
76C
76F
103
19B
Spring Valley
(Joins sheet 16)
END OF SOIL SURVEY
BIG SPRING STATE PARK
12
7
13
18
76D
42D
Big Spring Lookout Tower
Kinnard Hollow
Chilton Creek
(Joins sheet 19)
350 000 FEET

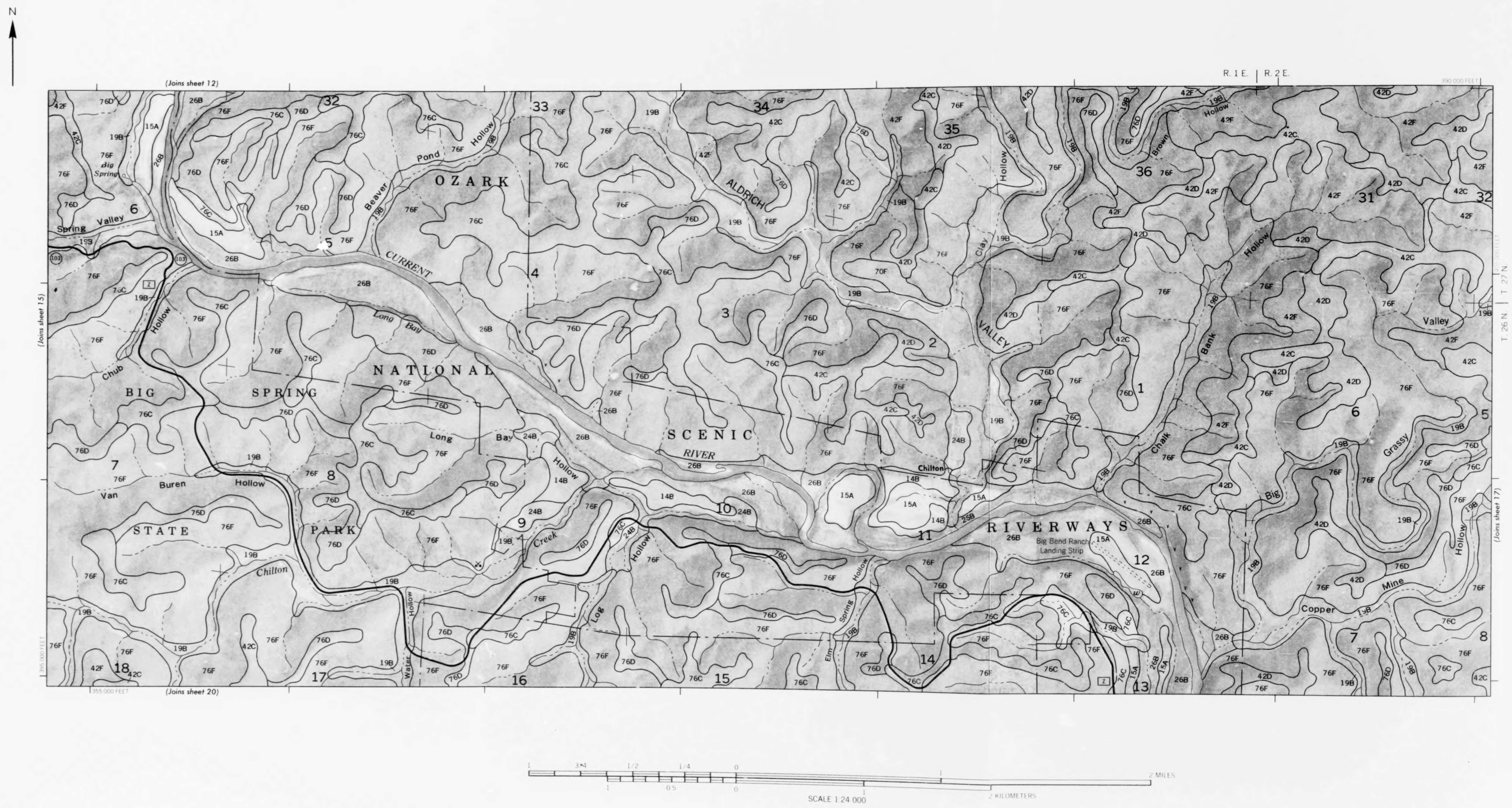
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

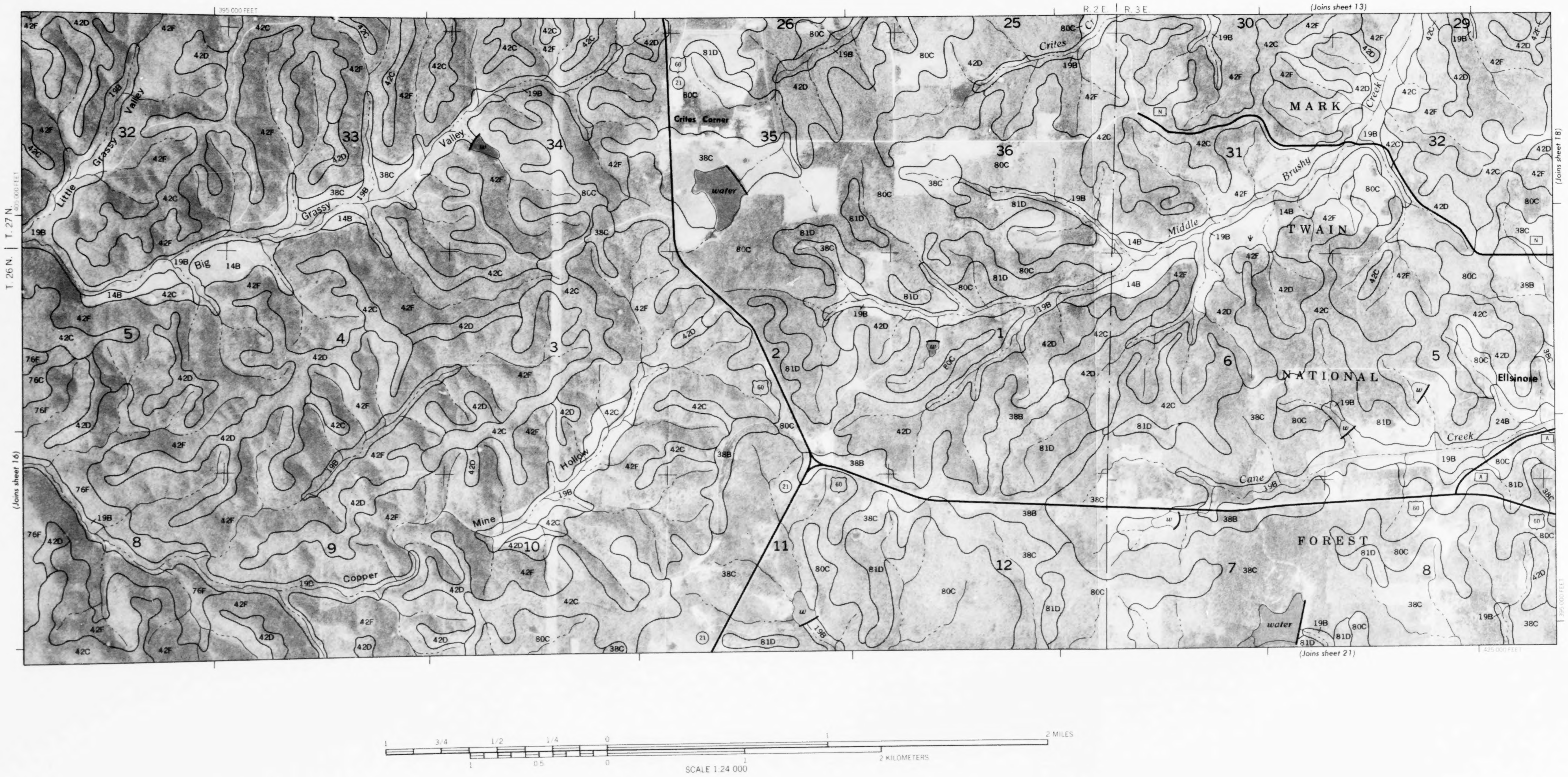
SCALE 1:24 000

CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 14

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 16


N
(Joins sheet 12)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 20)
R. 1 E.
R. 2 E.
T. 27 N.
T. 26 N.
390 000 FEET
355 000 FEET
OZARK
NATIONAL
SCENIC
RIVERWAYS
BIG
SPRING
STATE
PARK
CURRENT
RIVER
Big Spring
Spring Valley
Chub Hollow
Van Buren Hollow
Chilton
Chilton Creek
Long Bay
Bay
Beaver Pond Hollow
Aldrich
Clay Hollow
Valley
Brown Hollow
Bank Hollow
Chalk
Big Grassy Hollow
Copper Mine Hollow
Valley
Log Hollow
Elm Spring Hollow
Water Hollow
Hollow
Big Bend Ranch Landing Strip
15A
14B
19B
24B
26B
42C
42D
42F
70F
76C
76D
76F
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
31
32
33
34
35
36
1
3/4
1/2
1/4
0
1
2 MILES
0.5
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 17

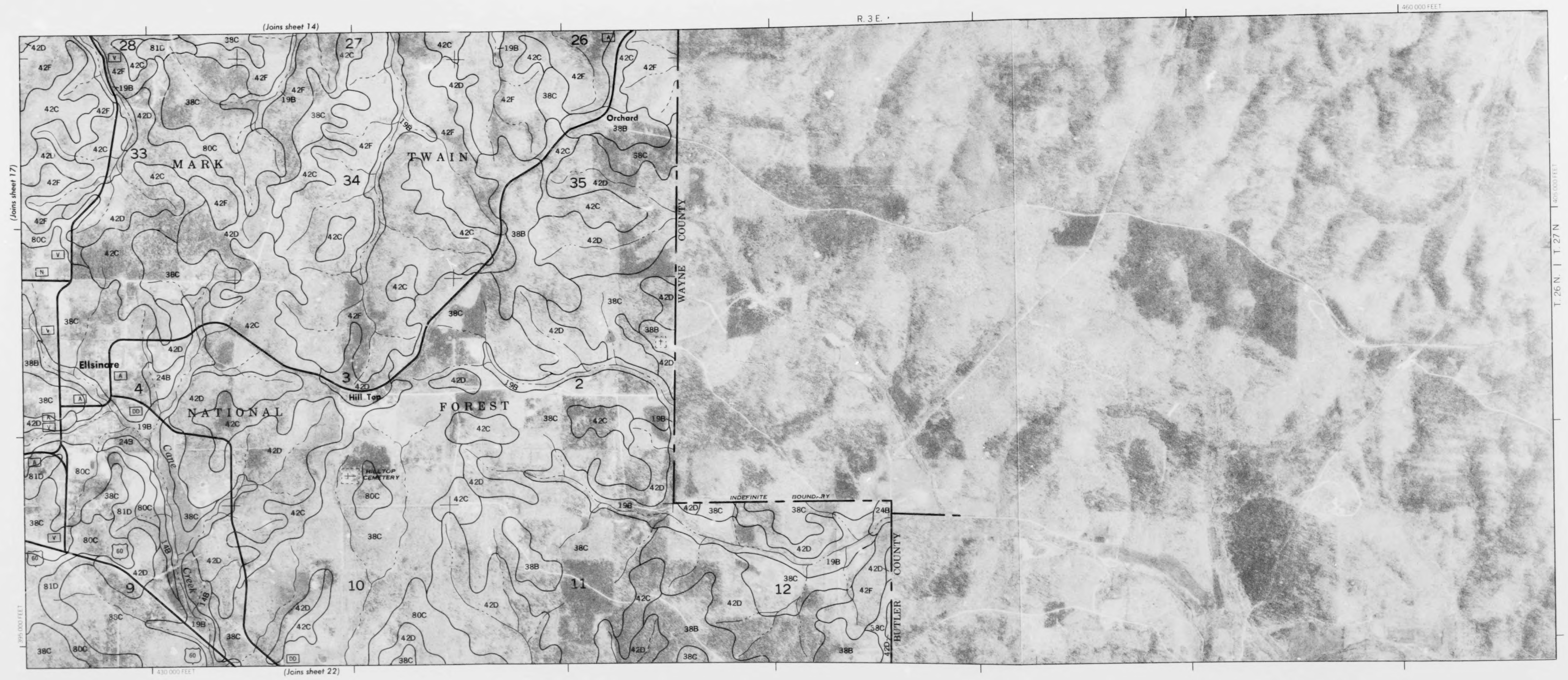

N
(Joins sheet 13)
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 21)
395 000 FEET
425 000 FEET
T. 27 N.
T. 26 N.
R. 2 E.
R. 3 E.
Crites Corner
water
Crites Cr.
Little Grassy Valley
Big Grassy Valley
Copper Mine Hollow
Middle Brushy Creek
Cane Creek
MARK TWAIN NATIONAL FOREST
Ellsinore
21
60
N
A
14B
19B
24B
38B
38C
42C
42D
42F
76C
76F
80C
81D
1
2
3
4
5
6
7
8
9
10
11
12
25
26
29
30
31
32
33
34
35
36
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 16

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 18

⑱

N

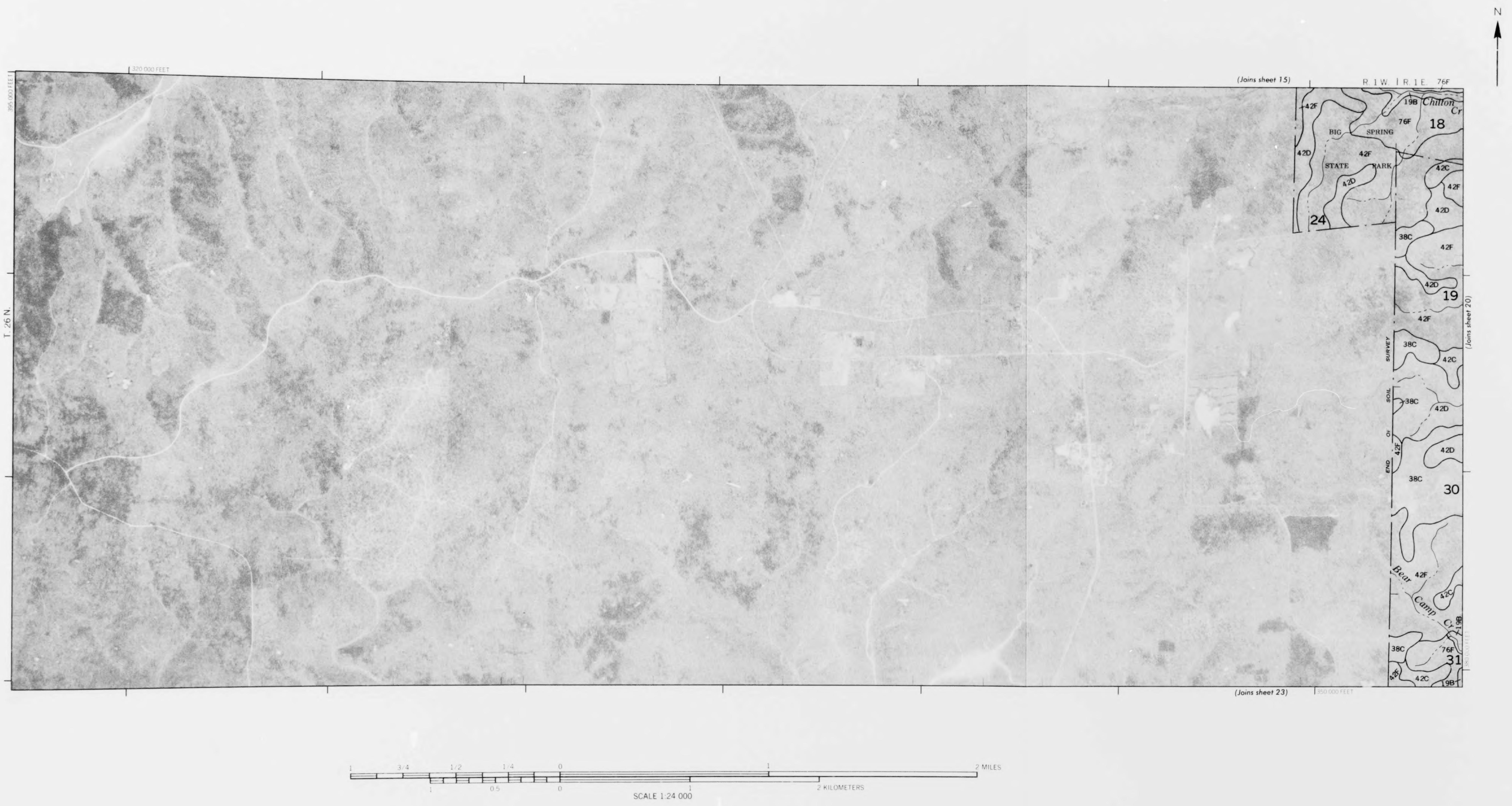

(Joins sheet 14)
(Joins sheet 17)
(Joins sheet 22)
R. 3 E.
460 000 FEET
430 000 FEET
T. 27 N.
T. 26 N.
MARK
TWAIN
NATIONAL
FOREST
Ellsinore
Orchard
Hill Top
Hilltop Cemetery
Cane Creek
WAYNE COUNTY
BUTLER COUNTY
INDEFINITE BOUNDARY
28
27
26
33
34
35
4
3
2
9
10
11
12
42C
42D
42F
38B
38C
19B
24B
80C
81D

1 3/4 1/2 1/4 0 1 2 MILES

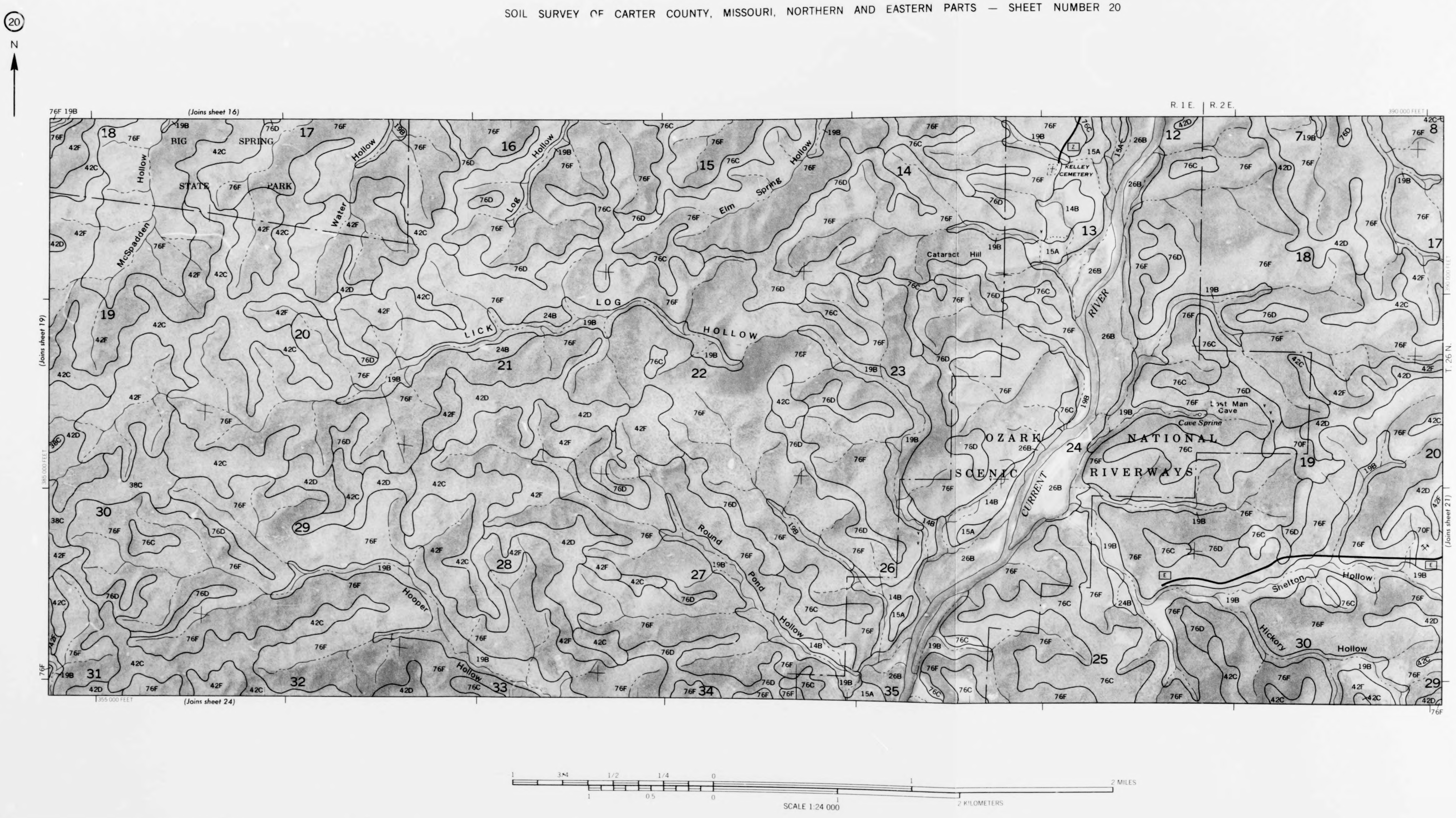
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

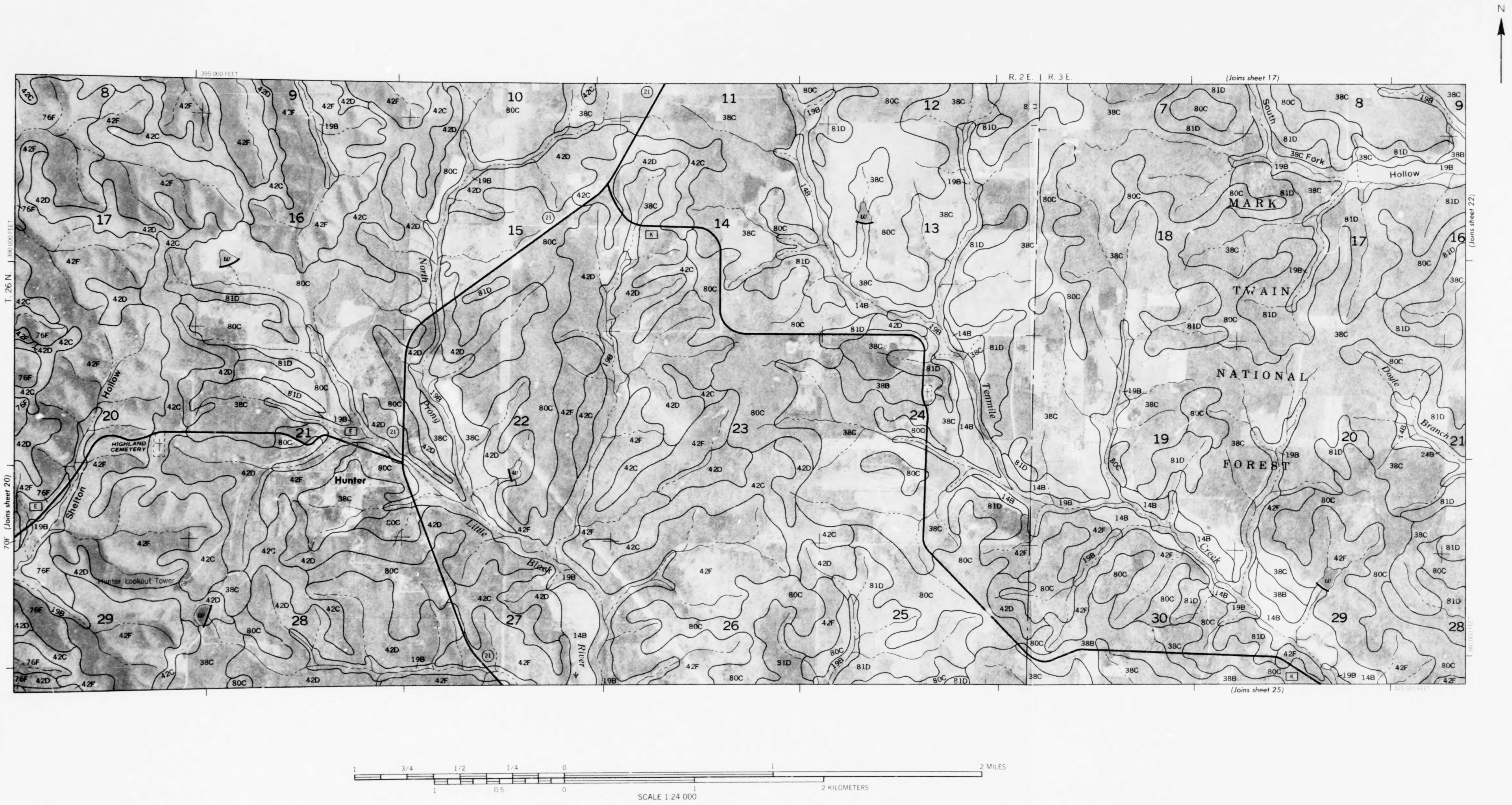
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 19


N
320 000 FEET
395 000 FEET
T. 26 N.
(Joins sheet 15)
R. 1 W.
R. 1 E.
76F
42F
19B
Chilton Cr
76F
18
BIG
SPRING
42D
42F
STATE
PARK
42D
24
42C
42F
42D
38C
42F
42D
19
42F
(Joins sheet 20)
SURVEY
SOIL
OF
END
38C
42C
38C
42D
42F
42D
38C
30
Bear Camp Cr
42F
42C
19B
38C
76F
31
42F
42C
19B
380 000 FEET
(Joins sheet 23)
350 000 FEET
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

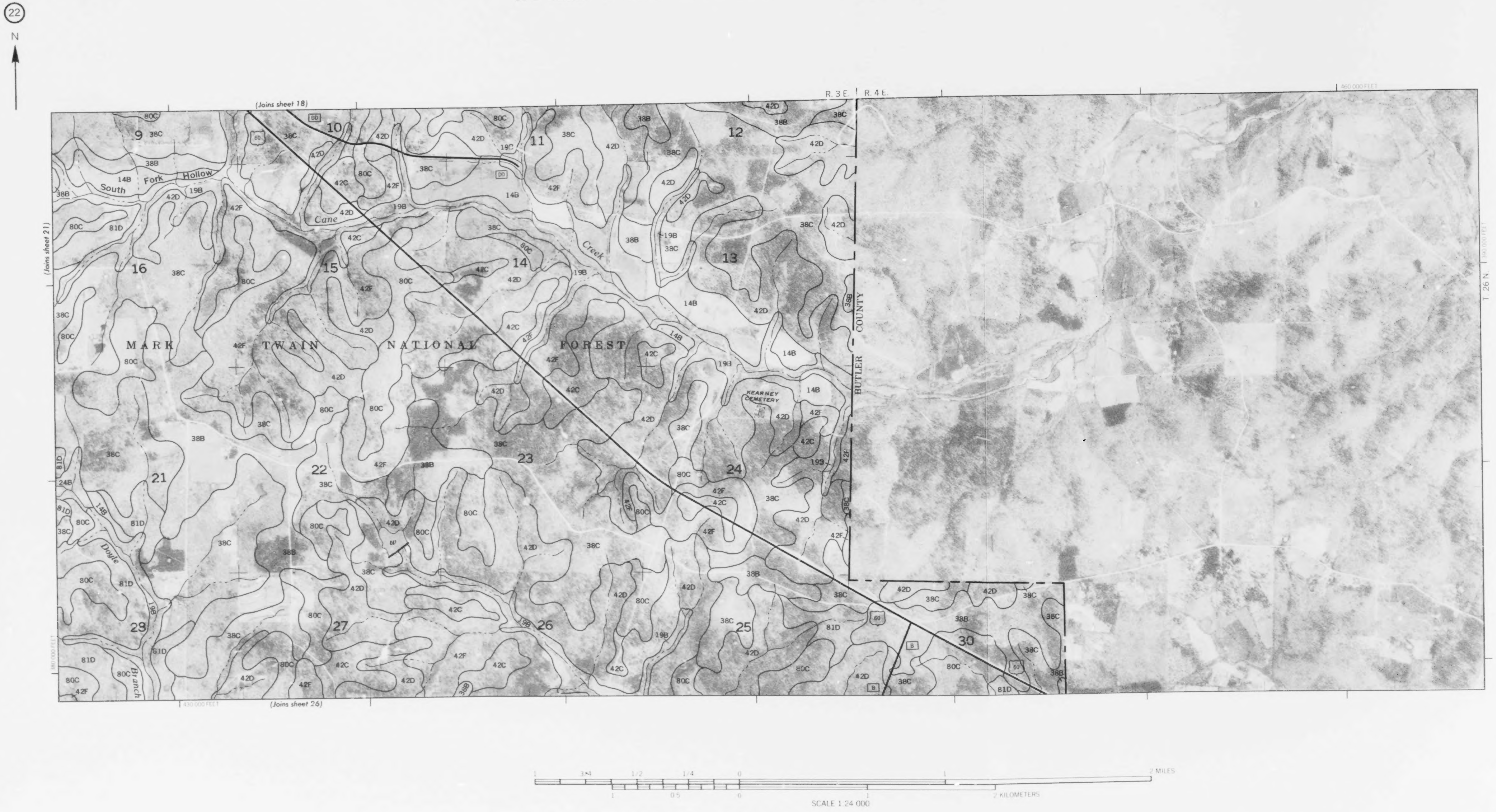
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 20


⑳
N
(Joins sheet 16)
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 24)
R. 1 E.
R. 2 E.
T. 26 N.
390 000 FEET
385 000 FEET
355 000 FEET
BIG SPRING STATE PARK
McSpadden Hollow
Water Hollow
Log Hollow
Elm Spring Hollow
LICK LOG HOLLOW
Cataract Hill
KELLEY CEMETERY
CURRENT RIVER
OZARK NATIONAL SCENIC RIVERWAYS
Lost Man Cave
Cave Spring
Round Pond Hollow
Hooper Hollow
Shelton Hollow
Hickory Hollow
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 21


N
395 000 FEET
R. 2 E. | R. 3 E.
(Joins sheet 17)
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 25)
T. 26 N.
MARK
TWAIN
NATIONAL
FOREST
Hunter
HIGHLAND CEMETERY
Hunter Lookout Tower
Shelton
Hollow
North
Prong
Little
Black
River
Tenmile
South
Fork
Hollow
Doyle
Branch
Creek
21
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

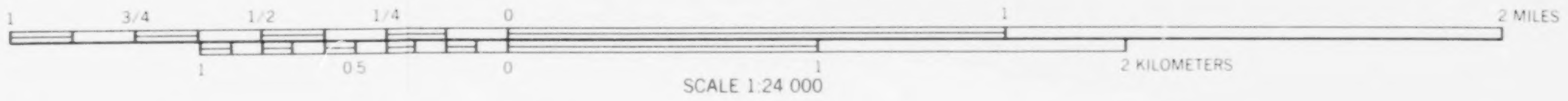
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 22



22
N
(Joins sheet 18)
(Joins sheet 21)
(Joins sheet 26)
R. 3 E.
R. 4 E.
T. 26 N.
430 000 FEET
460 000 FEET
390 000 FEET
380 000 FEET
MARK TWAIN NATIONAL FOREST
BUTLER COUNTY
South Fork Hollow
Cane Creek
Doyle Branch
KEARNEY CEMETERY
9
10
11
12
13
14
15
16
21
22
23
24
25
26
27
28
30
14B
19B
24B
38B
38C
42C
42D
42F
80C
81D
2 MILES
2 KILOMETERS
SCALE 1:24 000

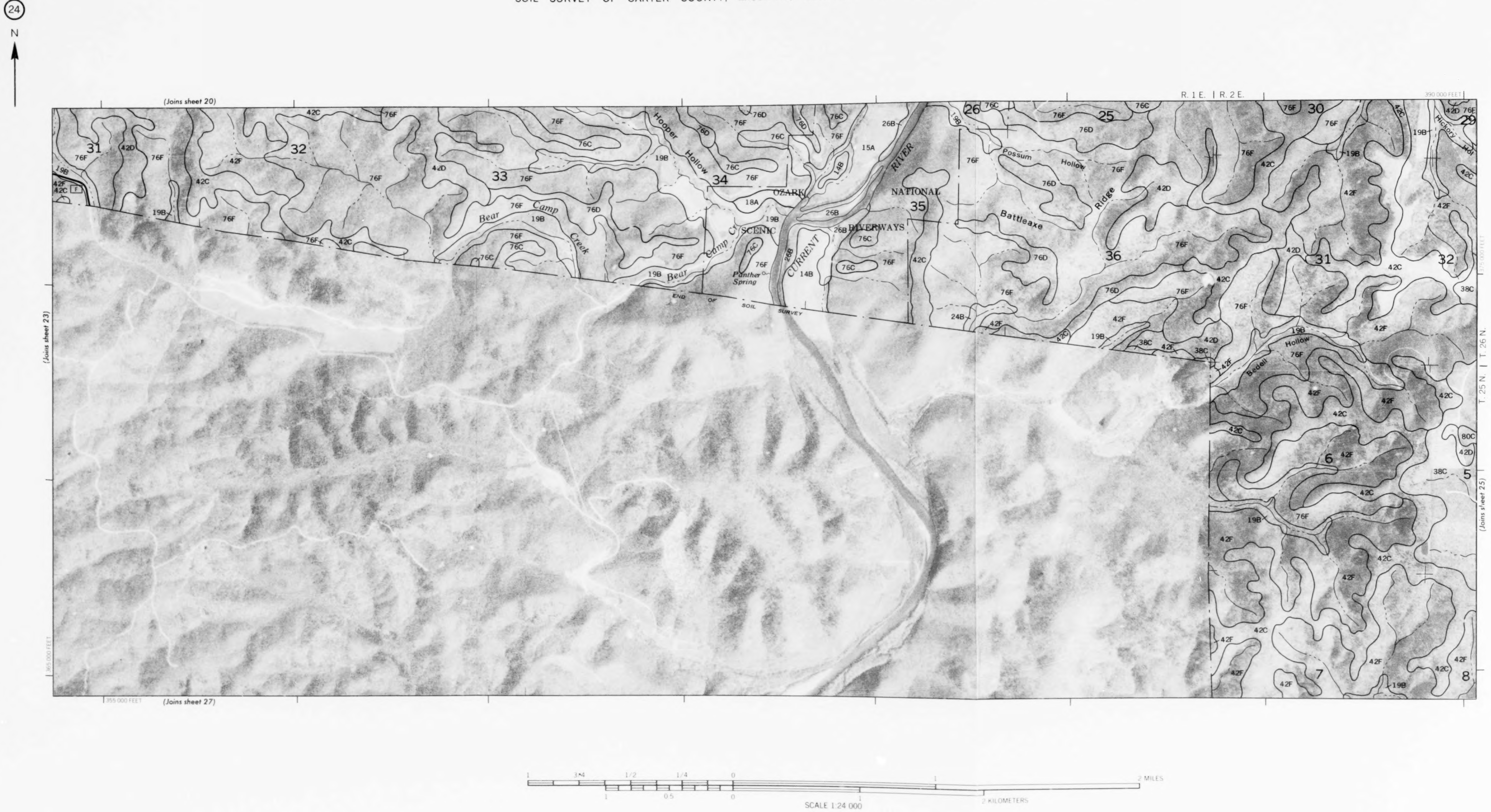
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 23

N
320 000 FEET
R. 1 E.
(Joins sheet 19)
375 000 FEET
T. 26 N.
(Joins sheet 24)
350 000 FEET
31
42F
42C
76F
19B
42F
42F
END OF SOIL SURVEY


1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS

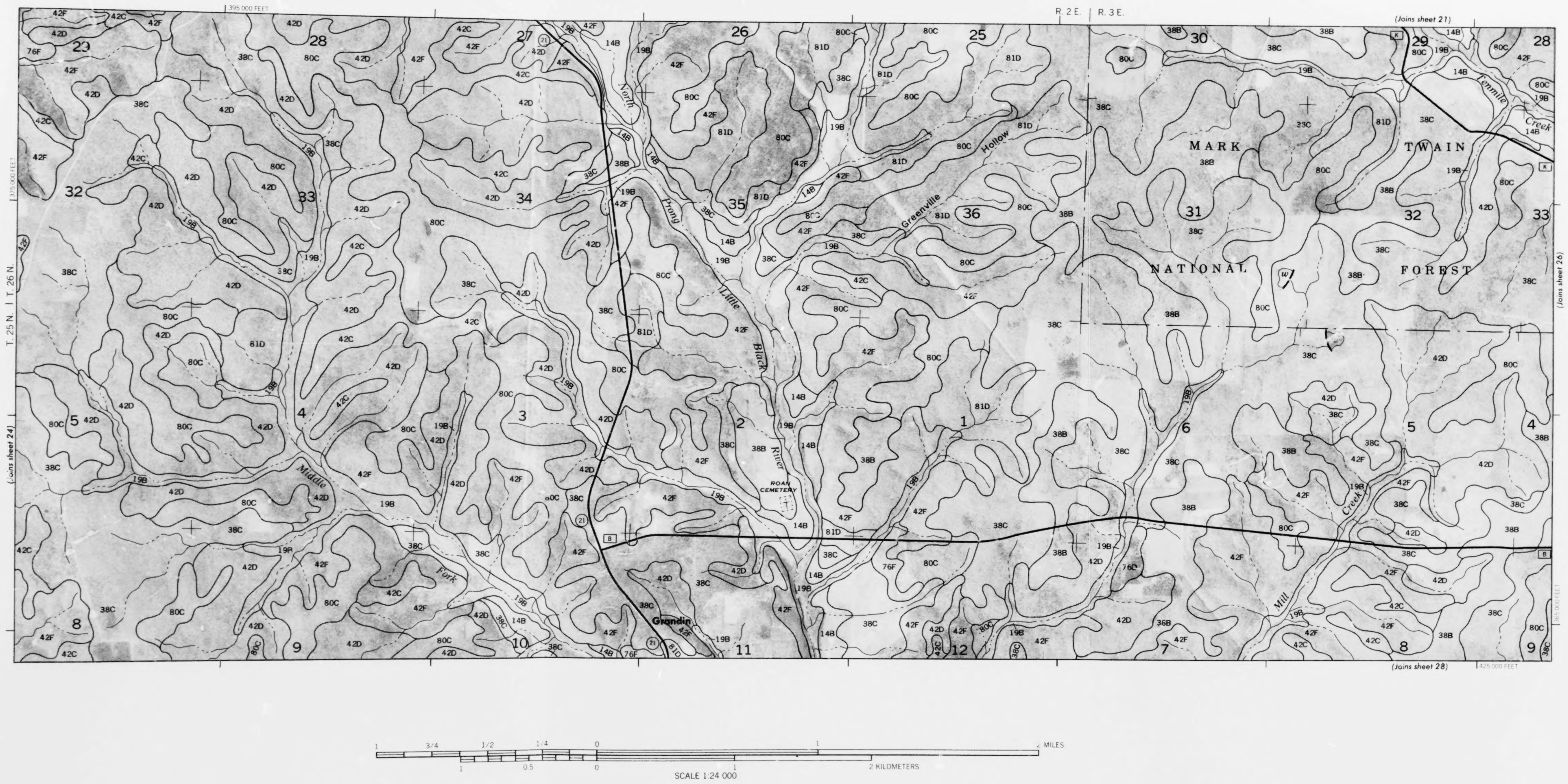
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 24



24
N
(Joins sheet 20)
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 27)
R. 1 E. | R. 2 E.
T. 25 N. | T. 26 N.
390 000 FEET
375 000 FEET
355 000 FEET
Hooper Hollow
Bear Camp Creek
Bear Camp Cr.
Panther Spring
OZARK SCENIC RIVERWAYS
NATIONAL
CURRENT RIVER
Possum Hollow
Battleaxe Ridge
Hickory Hol
Bedell Hollow
END OF SOIL SURVEY
31
32
33
34
35
36
26
25
30
29
31
32
5
6
7
8
14B
15A
18A
19B
24B
26B
38C
42C
42D
42F
76C
76D
76F
80C
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 25


N
(Joins sheet 21)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 24)
395 000 FEET
425 000 FEET
R. 2 E.
R. 3 E.
T. 25 N.
T. 26 N.
MARK TWAIN NATIONAL FOREST
North Prong Little Black River
Greenville Hollow
Middle Fork
Mill Creek
ROAN CEMETERY
Grandin
21
B
K
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

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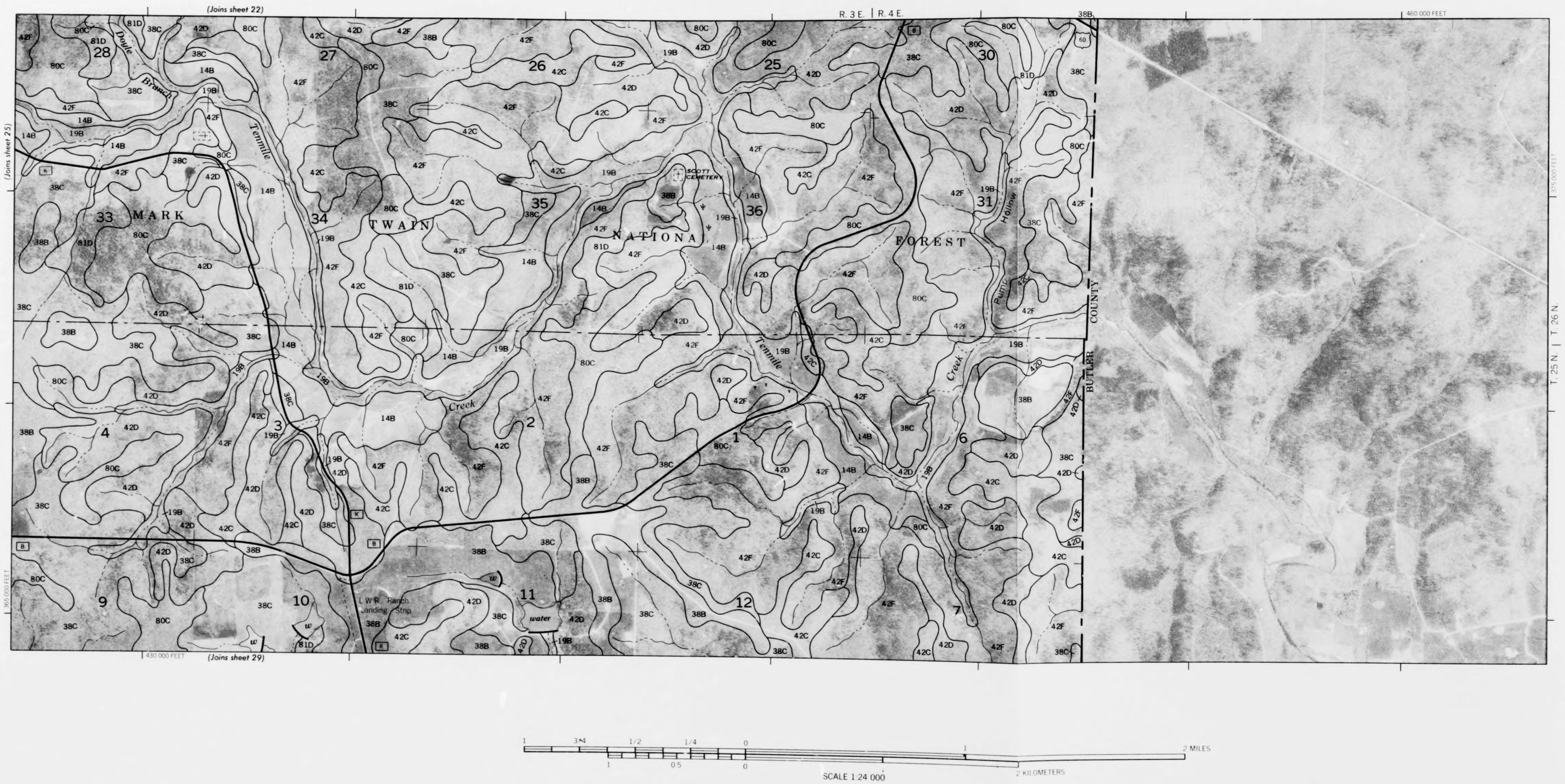
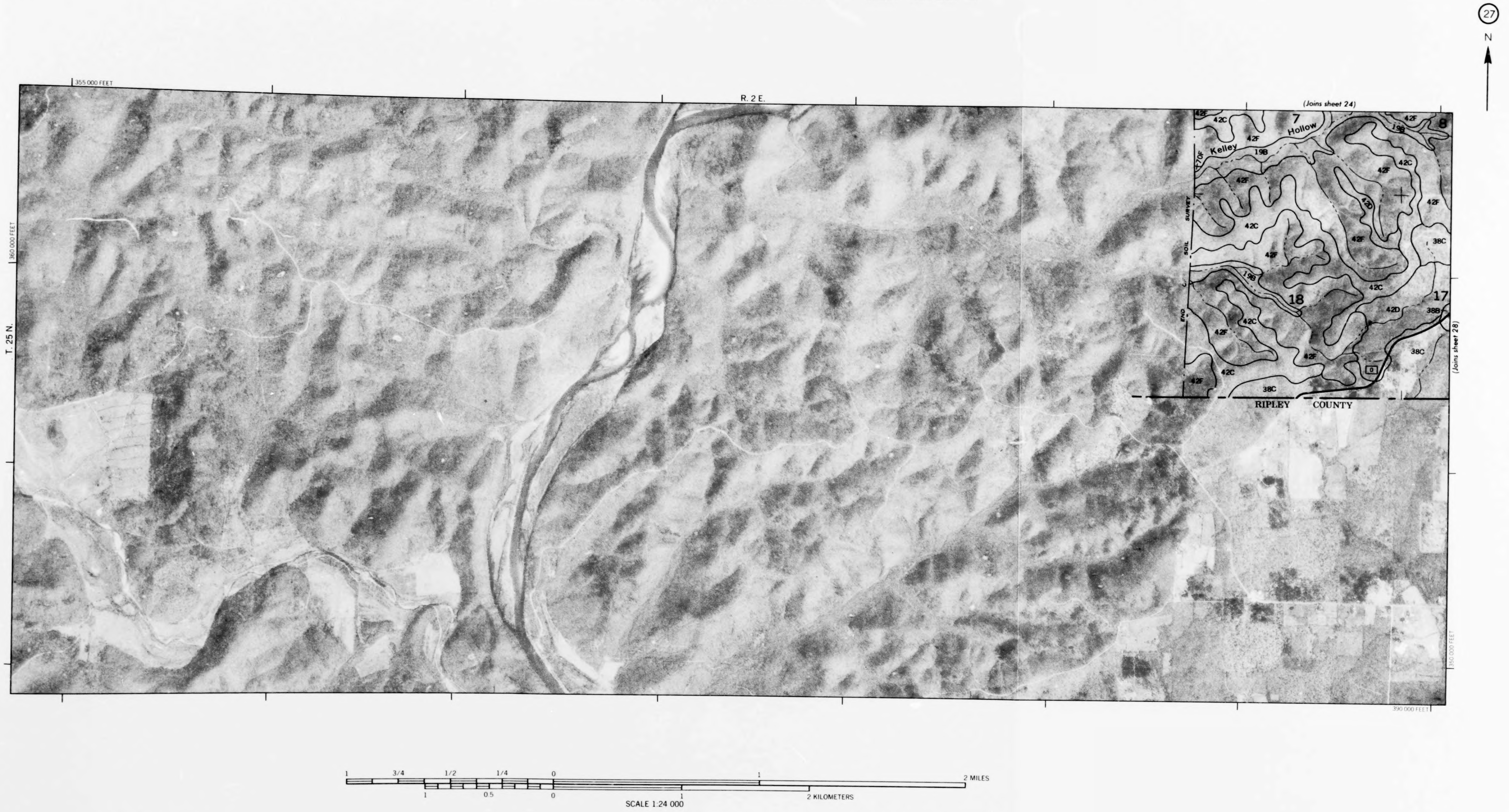
N

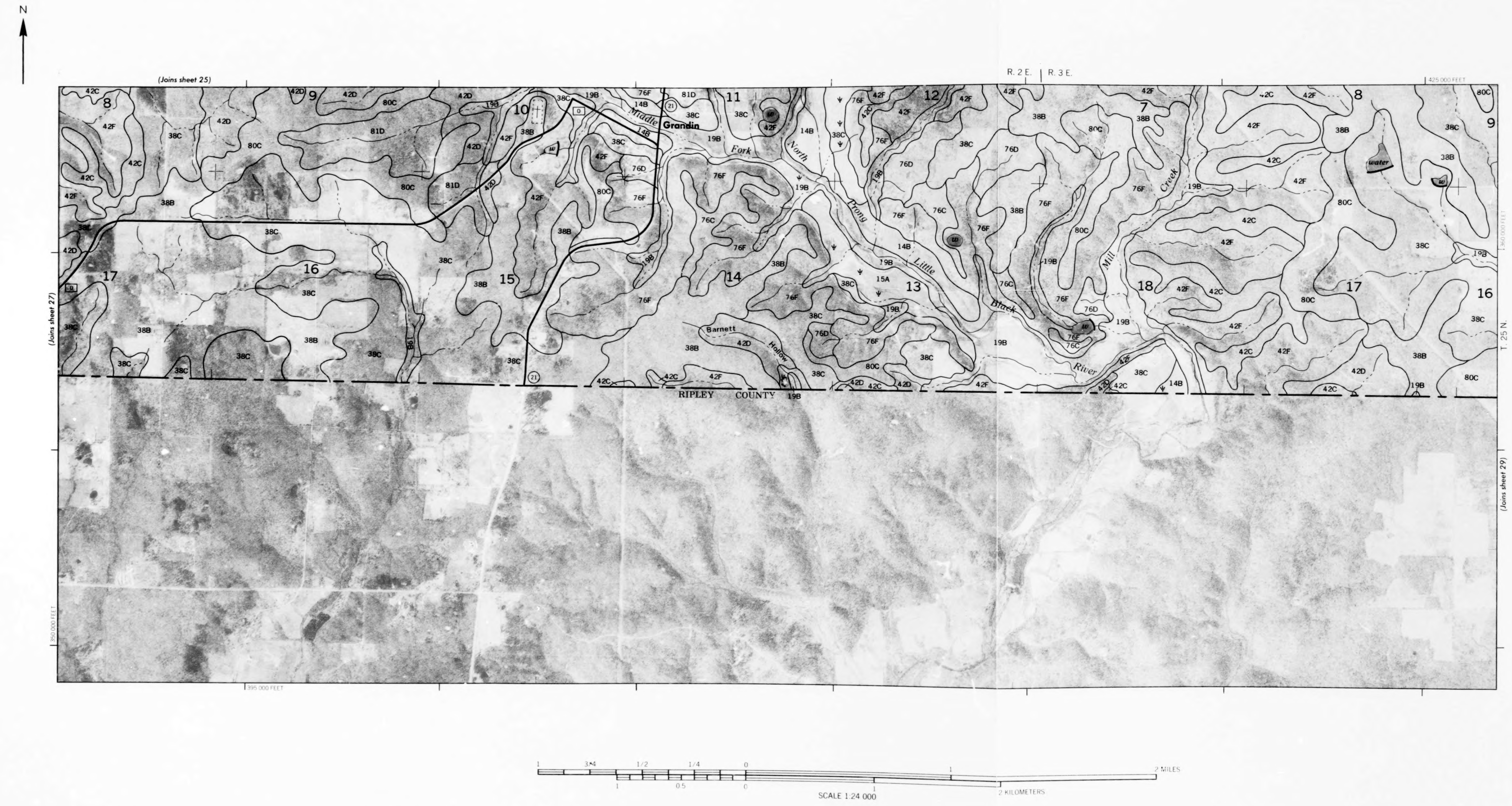
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 26


(Joins sheet 22)
(Joins sheet 25)
(Joins sheet 29)
R. 3 E. | R. 4 E.
T. 25 N. | T. 26 N.
430 000 FEET
460 000 FEET
365 000 FEET
375 000 FEET
MARK TWAIN NATIONAL FOREST
BUTLER COUNTY
Tenmile Creek
Doyle Branch
Pump Hollow
SCOTT CEMETERY
L W R Ranch Landing Strip
water
28
27
26
25
30
33
34
35
36
31
4
3
2
1
6
9
10
11
12
7
14B
19B
38B
38C
42C
42D
42F
80C
81D
1
3/4
1/2
1/4
0
2 MILES
1
0.5
0
2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 27


27
N
355 000 FEET
R. 2 E.
(Joins sheet 24)
360 000 FEET
T. 25 N.
42F
42C
7
Hollow
Kelley
19B
70F
8
42D
38C
SOIL SURVEY
END
18
17
38B
0
(Joins sheet 28)
RIPLEY COUNTY
390 000 FEET
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000

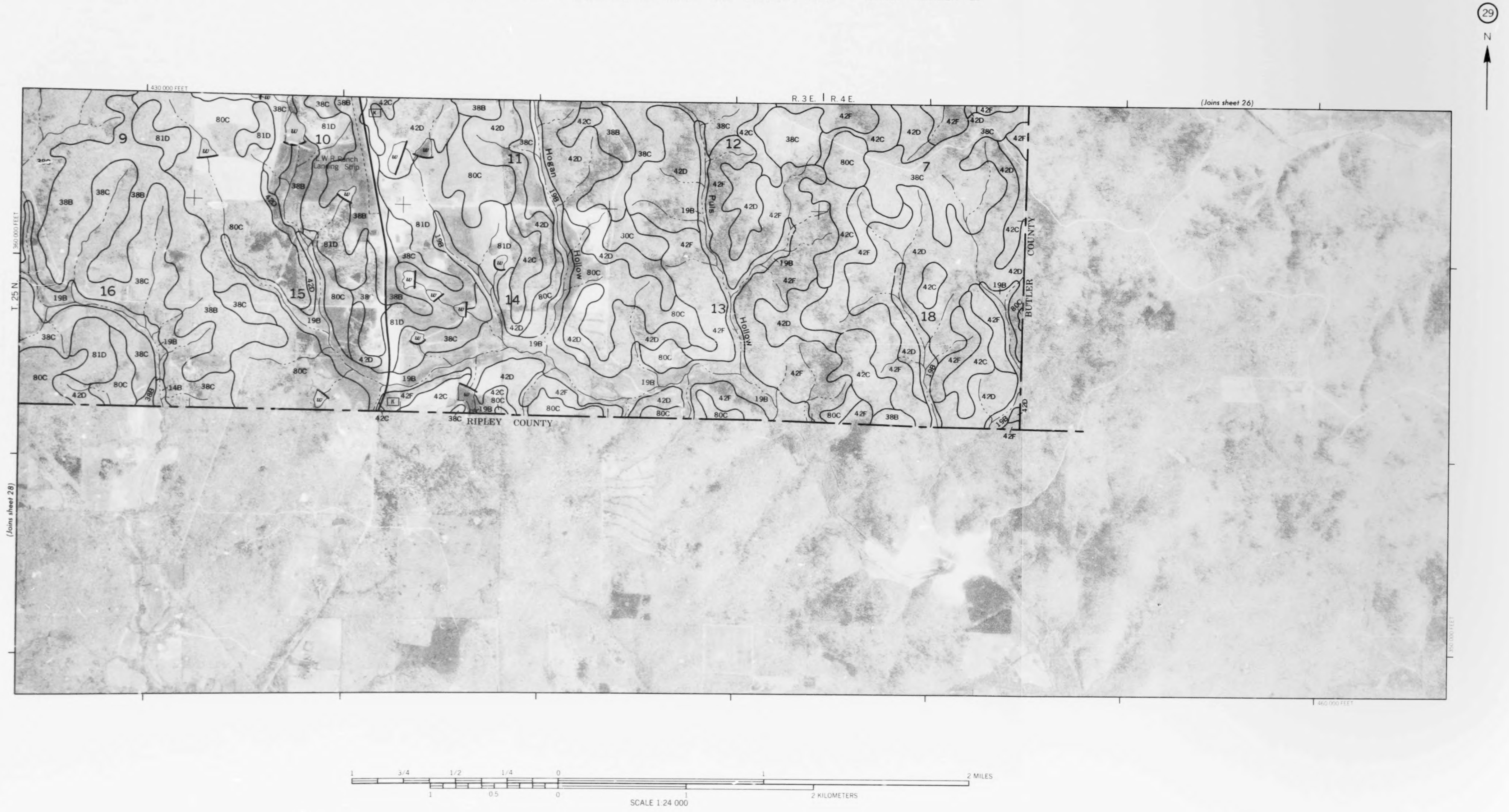
SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 28


N
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 29)
R. 2 E. | R. 3 E.
T. 25 N.
425 000 FEET
360 000 FEET
395 000 FEET
350 000 FEET
Grandin
Middle Fork
North Prong Little Black River
Mill Creek
Barnett Hollow
RIPLEY COUNTY
water
8
9
10
11
12
7
8
9
17
16
15
14
13
18
17
16
42C
42F
42D
80C
81D
38B
38C
19B
14B
76F
76D
76C
81D
15A
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CARTER COUNTY, MISSOURI, N AND E PARTS NO 28

CARTER COUNTY, MISSOURI, N. AND E. PARTS NO. 28

SOIL SURVEY OF CARTER COUNTY, MISSOURI, NORTHERN AND EASTERN PARTS — SHEET NUMBER 29


29
N
430 000 FEET
R. 3 E. | R. 4 E.
(Joins sheet 26)
(Joins sheet 28)
T. 25 N.
360 000 FEET
460 000 FEET
RIPLEY COUNTY
BUTLER COUNTY
Hogan Hollow
Puls Hollow
W. R. Ranch Landing Strip
9
10
11
12
7
16
15
14
13
18
38B
38C
42C
42D
42F
80C
81D
19B
14B
30C
w
1
3/4
1/2
1/4
0
1
2 MILES
1
0.5
0
1
2 KILOMETERS
SCALE 1:24 000